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83 ECONOMICS AND COST ANALYSIS 441
Includes cost effectiveness studies.

84 LAW AND POLITICAL SCIENCE 441
Includes space law; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION 441
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences.*

88 SPACE SCIENCES (GENERAL) 441

89 ASTRONOMY 444
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS 446
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION 448
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

92 SOLAR PHYSICS 449
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION 449
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

GENERAL

99 GENERAL 449

Note: N.A. means that no abstracts were assigned to this category for this issue.

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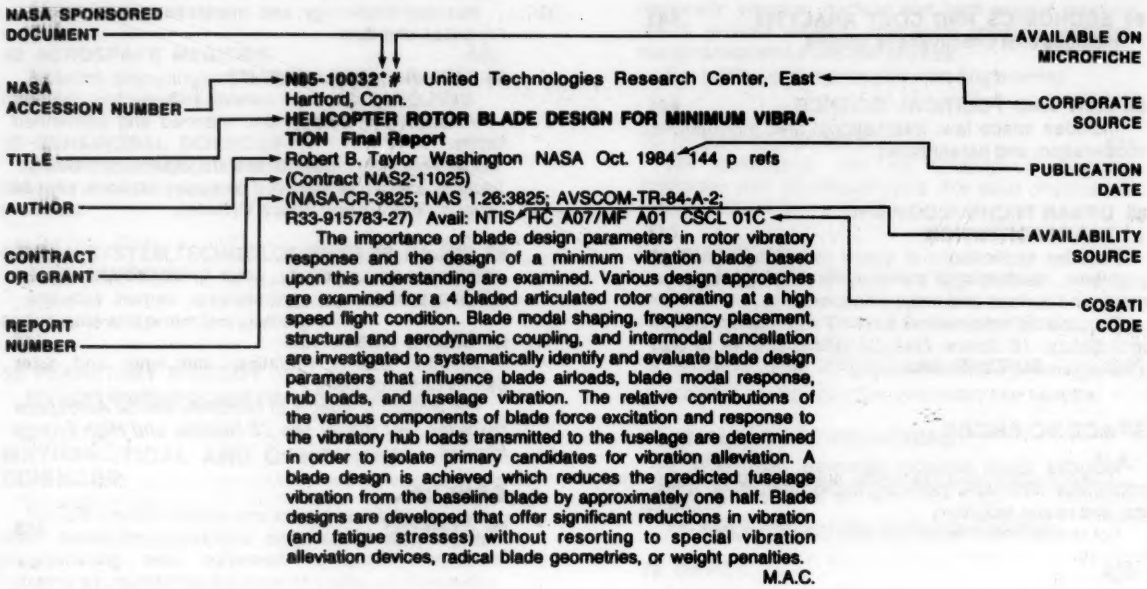
TYPICAL CITATION AND ABSTRACT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N85-10032*# United Technologies Research Center, East Hartford, Conn.
CORPORATE SOURCE
TITLE
HELICOPTER ROTOR BLADE DESIGN FOR MINIMUM VIBRATION Final Report
PUBLICATION DATE
AUTHOR
Robert B. Taylor Washington NASA Oct. 1984 144 p refs
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(Contract NAS2-11025)
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COSATI CODE
The importance of blade design parameters in rotor vibratory response and the design of a minimum vibration blade based upon this understanding are examined. Various design approaches are examined for a 4 bladed articulated rotor operating at a high speed flight condition. Blade modal shaping, frequency placement, structural and aerodynamic coupling, and intermodal cancellation are investigated to systematically identify and evaluate blade design parameters that influence blade airloads, blade modal response, hub loads, and fuselage vibration. The relative contributions of the various components of blade force excitation and response to the vibratory hub loads transmitted to the fuselage are determined in order to isolate primary candidates for vibration alleviation. A blade design is achieved which reduces the predicted fuselage vibration from the baseline blade by approximately one half. Blade designs are developed that offer significant reductions in vibration (and fatigue stresses) without resorting to special vibration alleviation devices, radical blade geometries, or weight penalties.
M.A.C.

VOLUME 23 NUMBER 3 / FEBRUARY 8, 1985

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N85-11976* National Aeronautics and Space Administration, Washington, D. C.
AERONAUTICAL ENGINEERING, A CONTINUING BIBLIOGRAPHY WITH INDEXES
Oct. 1984 187 p
(NASA-SP-7037(179); NAS 1.21:7037(179)) Avail: NTIS HC A09/MF A01 CSCL 01A

This bibliography lists 693 reports, articles and other documents introduced into the NASA scientific and technical information system in September 1984. Author

N85-11977# Politecnico di Torino (Italy). Dept. of Aerospace Engineering.
[REPORT OF THE DEPARTMENT OF AEROSPACE ENGINEERING] Annual Report, 1983
Apr. 1984 40 p
Avail: NTIS HC A03/MF A01

The objectives and activities in the department of aerospace engineering of the Twin Polytechnic Institute are outlined. Progress in research and development is reported. The areas of research include: (1) aeronautics and astronautics; (2) fluid dynamics and propulsion; (3) structures and materials; and (4) systems engineering and management. E.A.K.

N85-11978# Defense Systems Management School, Fort Belvoir, Va.
DOD ROBOTICS APPLICATION WORHSHOP PROCEEDINGS
1983 482 p
(AD-A145867) Avail: NTIS HC A21/MF A01 CSCL 13/8

The ten robotics-related technical areas addressed in this workshop were: (1) Applications; (2) Installation/Design Concepts; (3) Safety and Security; (4) Languages; (5) Controls and Integrated Systems; (6) Mechanical Systems and Precision Operations; (7) Vision systems; (8) Band and End Effectors; (9) Sensors; and (10) Transportability/Mobility. That robotics is a systems issue embedded in an automation framework is most apparent because the roundtable-developed menus in these ten technical areas show considerable interaction and overlap. However, a remarkable range of distinct applications, needs, and potential project investments emerged in each technical area, many of which were unique and did not overlap the concepts developed in other roundtables. For individual titles, see N85-11979 through N85-11995.

N85-11979# Automatix, Inc., Woodside, Calif.
CURRENT SUCCESSFUL ROBOTICS APPLICATIONS BY THE AUTOMATIX COMPANY
V. Scheinman *In* Defense Systems Management Coll. DoD Robotics Appl. Workshop Proc. 1983 p 78-83 (For primary document see N85-11978 03-01)
(AD-P003998) Avail: NTIS HC A21/MF A01 CSCL 13/8

Automatix is a company engaged in the Robotics Systems Business. We make systems rather than just robots. In fact, at the present time, Automatix does not make any of what one might call the traditional robots...the mechanical manipulation mechanisms. Instead we make just about everything else--the controllers, the positioners, the fixtures, the sensors, the software, and the factory floor interfaces. In general, we deliver all of this, with robots, as a turn-key package to the customer. GRA

N85-11980# Oklahoma City Air Logistics Center, Tinker AFB, Okla.
AIR FORCE ENGINE REPAIR - OKLAHOMA CITY AIR LOGISTICS CENTER, PROPULSION DIVISION
M. Leblanc *In* Defense Systems Management Coll. DoD Robotics Appl. Workshop Proc. 1983 p 117-126 (For primary document see N85-11978 03-01)
(AD-P003999) Avail: NTIS HC A21/MF A01 CSCL 21/5

This paper provides an introduction to the jet engine overhaul facilities and process at the Oklahoma City Air Logistics Center, which produces approximately 200 aircraft, 1200 engine and 300,000 component items each year. GRA

N85-11981# Warner Robins Air Materiel Area, Robins AFB, Ga.
ELECTRONICS/AVIONICS DEPOTS IN THE UNITED STATES AIR FORCE WARNER ROBINS AIR LOGISTICS CENTER
B. Ramsey *In* Defense Systems Management Coll. DoD Robotics Appl. Workshop Proc. 1983 p 127-131 (For primary document see N85-11978 03-01)
(AD-P004000) Avail: NTIS HC A21/MF A01 CSCL 01/3

Maintaining complex Airborne Electronic Systems has historically been accomplished at three repair levels. The technical level of repair is dependent upon the complexity of the test equipment needed to isolate the malfunctions and then to functionally test a repaired item. No less important is the repair requirements involving facilities (heating, air conditioning, humidity, cleanrooms) and the special tools, fixtures and equipment with the skilled technicians and engineers whose knowledge utilize these resources. The Electronic Depots at Ogden ALC, UT; Sacramento ALC, CA; San Antonio ALC, TX and Warner Robins ALC, GA meet the need of repairing these items that cannot be repaired at field level. GRA

N85-11982# Ogden Air Logistics Center, Hill AFB, Utah.
AIR FORCE LANDING GEAR REPAIR - OGDEN AIR LOGISTICS CENTER INDUSTRIAL PRODUCTS AND LANDING GEAR DIVISION
T. Hruskocy *In* Defense Systems Management Coll. DoD Robotics Appl. Workshop Proc. 1983 p 132-265 (For primary document see N85-11978 03-01)
(AD-P004001) Avail: NTIS HC A21/MF A01 CSCL 01/3

The repair process for worn aircraft landing gear assemblies at Hill Air Force Base, Utah is outlined. The facilities used in the overhaul sequence are described. R.S.F.

N85-11983# Oklahoma City Air Logistics Center, Tinker AFB, Okla.
JET ENGINE BLADE REPAIR AT THE OKLAHOMA AIR LOGISTICS CENTER, PROPULSION DIVISION

M. Leblanc *In* Defense Systems Management Coll. DoD Robotics Appl. Workshop Proc. 1983 p 266-276 (For primary document see N85-11978 03-01)
(AD-P004003) Avail: NTIS HC A21/MF A01 CSCL 21/5

This report provides an introduction to the facilities and processes which are required to overhaul jet engine blades at the Oklahoma City ALC. In recent years, jet engine blade repair has become an increasingly important part of the overhaul requirements. Cost factors and availability of materials have resulted in repair processes being implemented to salvage blades which, in past years, would have been condemned. GRA

N85-11984# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
AIR FORCE PLASMA SPRAY AT SA-ALC (SAN ANTONIO AIR LOGISTICS CENTER)
S. Lee *In* Defense Systems Management Coll. DoD Robotics Appl. Workshop Proc. 1983 p 277-290 (For primary document see N85-11978 03-01)
(AD-P004004) Avail: NTIS HC A21/MF A01 CSCL 13/8

The challenge in the Manufacturing Technology (MT) program is to improve productivity and minimize operator safety hazards by establishing an integrated computerized thermal spray cell that encompasses automated surface preparation, process control, part manipulation and spray gun control. The automated systems must be flexible and adaptable to changes in work load requirements and part configuration. The automated plasma spray cell is the first building block for eventual establishment of a thermal spray processing center that will include flame spray, wire spray and possibly vacuum plasma spray cells. Many operations such as parts handling, pre/cost coating surface treatments, maskings, parts flow, etc., are largely common to all three thermal spray processes used at the ALC. The MT program should clearly identify cost drivers and impediments to productivity using methodical ICAM modeling techniques. These factors will be accounted for in designing and implementing the automated plasma spray cell. The cell will be implemented at San Antonio Air Logistics Center at Kelly AFB, TX in late 1984. GRA

N85-11985# Sacramento Air Logistics Center, McClellan AFB, Calif.
AIR FORCE HONEYCOMB SHAPING AT SM-ALC (SACRAMENTO AIR LOGISTICS CENTER)
G. Betz *In* Defense Systems Management Coll. DoD Robotics Appl. Workshop Proc. 1983 p 291-306 (For primary document see N85-11978 03-01)
(AD-P004005) Avail: NTIS HC A21/MF A01 CSCL 17/8

The system described in this paper is being developed by Robotic Vision Systems, Inc. and is part of the Manufacturing Technology for Integration of Advance Repair Bonding Technique. At present repair of bonded metal honeycomb aircraft structure is performed with manual techniques which are labor intensive and result in repair quality dependent on the skill and patience of the repairman. These manual techniques are not only costly in terms of repair labor and materials but also, as a consequence of the long cycle time, costly in terms of aircraft availability. The system described in this paper will substantially decrease repair cycle time and improve quality of repair by providing an automated means to dimensionally define the repair area and accomplish accurate cutting and inspection of honeycomb structures. The optical measurement system is able to accurately digitize the entire surface contours of the area to be repaired in significantly less time than provided by contacting systems. Further, since the optical measurement technique will be used, there will be no danger of core damage which can be caused by contact measurement probes. GRA

N85-11986# Ogden Air Logistics Center, Hill AFB, Utah.
AIR FORCE, ROBOTIC PAINTING **c37**
R. V. Grabler *In* Defense Systems Management Coll. DoD Robotics Appl. Workshop Proc. 1983 p 307-314 (For primary document see N85-11978 03-01)
(AD-P004006) Avail: NTIS HC A21/MF A01 CSCL 13/8

This paper briefly reviews Ogden ALC's proposed applications of robotics in an aerospace industrial facility. Specifically the paper presents their experiences with the Devilbiss/Trallfa TR-3500 robot that is used for stripping and painting U.S. Air Force Sidewinder missiles at the Ogden depot. GRA

N85-11987# Letterkenny Army Depot, Chambersburg, Pa.
NEO ROBOTIC APPLICATION DEVELOPMENT AT LETTERKENNY ARMY DEPOT: THE APPLICATION OF ROBOTICS TO AGRICULTURAL BLAST CLEANING **c37**
J. Nitterhouse and S. Kalabokes *In* Defense Systems Management Coll. DoD Robotics Appl. Workshop Proc. 1983 p 358-362 (For primary document see N85-11978 03-01)
(AD-P004007) Avail: NTIS HC A21/MF A01 CSCL 13/8

M109 and M110 Howitzer hulls and turrets must be blast cleaned to remove old paint and rust from metal surfaces prior to prep and final painting. Walnut shells are impelled against the vehicle surface at forces ranging from 110 to 150 PSI. Because of the varying tenacity of the old paint at different areas along the vehicle, the removal rate differs at any given point on the surface of the vehicle until bare metal is visible; he then moves the nozzle to the next area to continue the process. The decision to robotize the agricultural blast cleaning operation at Letterkenny is founded on the inefficiency of the current process as well as to the hazards posed to the human operator. The worker is subjected to excessive heat, as high as 120 degrees F in the summer, humidity as high as 90% saturation, high noise levels and poor ventilation. Moreover, aerosols are generated which create an atmosphere conducive to explosion with the aid of an ignition source. The authors conclude that the robotic approach should be a viable replacement to the manual operation pending proper design and installation. It will offer improved conditions over the current method in terms of cost, safety and readiness. GRA

N85-11988# Defense Logistics Agency, Alexandria, Va.
DEPOT MODERNIZATION AT THE DEFENSE LOGISTICS AGENCY **c37**
T. L. Kirkham *In* Defense Systems Management Coll. DoD Robotics Appl. Workshop Proc. 1983 p 364-367 (For primary document see N85-11978 03-01)
(AD-P004008) Avail: NTIS HC A21/MF A01 CSCL 15/5

Since DLA has a mission of storing and handling hazardous materials in our depots and disposal sites, there are some areas of potential application of robotics for the sake of safety and health of our employees. The author concludes that: (1) DLA's investment in robotics equipment will be primarily in support of automated/mechanized materials handling systems, and (2) Since DLA is oriented towards buying off-the-shelf equipment, whatever is available in robotics equipment as a proven materials handling device will be considered for application in our depots. GRA

N85-11989# Air Force Logistics Command, Wright-Patterson AFB, Ohio.
LASER PAINT REMOVAL **c36**
T. Mallets *In* Defense Systems Management Coll. DoD Robotics Appl. Workshop Proc. 1983 p 368-371 (For primary document see N85-11978 03-01)
(AD-P004009) Avail: NTIS HC A21/MF A01 CSCL 13/8

The Laser Paint Stripper program is a three phase effort which includes: feasibility demonstration; prototype optimization; and implementation at our Air Logistic Centers (depots) by FY88. Major technical areas that make up the automated system include: (1) laser device with power and uptime to handle the number and size of aircraft (F-16 vs C-5A); (2) the beam transport and manipulation system; (3) controls for beam/aircraft safety, alignment, and surface condition sensors; (4) integration software; and (5) cleanup of residue products. GRA

N85-11990# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
AIR FORCE MATERIALS LABORATORY PLANS/PROJECTS **c81**
S. Lee *In* Defense Systems Management Coll. DoD Robotics

Appl. Workshop Proc. 1983 p 372-378 (For primary document see N85-11978 03-01)
(AD-P004010) Avail: NTIS HC A21/MF A01 CSCL 05/1

The goal is to provide a technology base for smart assembly in aerospace batch manufacturing making extensive use of robotics. These technologies will be developed and subsequently demonstrated in a fctory environment through follow-on maufacturing technology programs. Several of the on-going Air Force programs will contribute significantly to the robotics technology base. A three pronged program called Advanced Robotics Systems for Aerospace Batch Manufacturing deals with off-line programming improved accuracy and technology demonstrations. The Manufacturing Control Language (MCL) enhancement, an off-line manufacturing cell control as well as an off-line programming robotic programming language, enables cell lay-out or design and robot motion programming to be accomplished and debugged computer terminal. A 3-D vision system will be demonstrated under a program with Robot Vision Systems Inc. This effort, will provide closed-loop real time control with enhanced position accuracy. B.W.

N85-11991# San Antonio Air Logistics Center, Kelly AFB., Tex.
FUTURE ROBOTICS PROGRAM AT SAN ANTONIO ALC (AIR LOGISTICS CENTER) c37
D. Ferry *In* Defense Systems Management Coll. DoD Robotics Appl. Workshop Proc. 1983 p 381-384 (For primary document see N85-11978 03-01)
(AD-P004011) Avail: NTIS HC A21/MF A01 CSCL 13/8

The main thrust of a 1982 study is the identification of six candidates for best application of robotic and automation. These six were then designed, cost estimated, and analyzed for cost/benefit and return on investment for possible future implementation. They are: Robotic Machine Vision Inspection Station; Robotic Material Handling System; Robotic Deriveting System; Robotic Welding Station; Robotic Rework Station; and Robotic Inspection Station (F100 Flame Holder). The processes recommended are for high production and difficult to repair components. We intend to pursue these six projects during FY84 through 1986 timeframe, as potential initiatives in the productivity, reliability, availability, maintainability program (PRAM). GRA

N85-11992# Sacramento Air Logistics Center, McClellan AFB, Calif.
ROBOTICS IN NONDESTRUCTIVE INSPECTION AT SACRAMENTO AIR LOGISTICS CENTER c38
D. Froom *In* Defense Systems Management Coll. DoD Robotics Appl. Workshop Proc. 1983 p 385-390 (For primary document see N85-11978 03-01)
(AD-P004012) Avail: NTIS HC A21/MF A01 CSCL 14/2

Topics include: On-aircraft Maneuverable Real Time X-ray Inspection System; and On-aircraft Maneuverable Radiography Inspection System. GRA

N85-11993# Naval Supply Center, San Diego, Calif.
SUPPLY CENTER PROCESSES c37
A. Senhen *In* Defense Systems Management Coll. DoD Robotics Appl. Workshop Proc. 1983 p 438-461 (For primary document see N85-11978 03-01)
(AD-P004014) Avail: NTIS HC A21/MF A01 CSCL 15/5

The Naval Supply Centers supply the material needs for the fleet and shore activities including virtually all parts, provisions, and fuel needed to sustain day-to-day operations. (The Supply Centers are not responsible for maintaining or distributing ordnance). GRA

N85-11994# Letterkenny Army Depot, Chambersburg, Pa.
POTENTIAL APPLICATION OF ROBOTICS AND STATE-OF-THE ART END EFFECTORS AT LETTERKENNY ARMY DEPOT c37
J. Nitterhouse and S. Kalabokes *In* Defense Systems Management Coll. DoD Robotics Appl. Workshop Proc. 1983 p 464-467 (For primary document see N85-11978 03-01)
(AD-P004015) Avail: NTIS HC A21/MF A01 CSCL 13/8

Letterkenny Army Depot has targeted areas for potential automation in the intermediate term using robotics. Areas of consideration include the interface of a high technology end effector with a currently planned robotics system. The area in mind is the agricultural blast cleaning operation where planning efforts are directed at replacing the agricultural blast nozzle with a prototype cavitation water jet cleaning and effector. This paper briefly describes the current method of operation in these areas and plans and limitations for robotics applications. GRA

N85-11995# Tooele Army Depot, Utah.
FIELD APPLICATIONS FOR ROBOTIC MATERIEL HANDLING c37
F. Eldredge *In* Defense Systems Management Coll. DoD Robotics Appl. Workshop Proc. 1983 p 473-476 (For primary document see N85-11978 03-01)
(AD-P004016) Avail: NTIS HC A21/MF A01 CSCL 15/5

This paper presents a description of interests and activities involved in the use of robotics and allied technologies for Army field applications in materiel handling roles. This presentation includes: (1) Motivators for using robotic technology in this new context; (2) Similarities and differences between technology required for robots used in industry and those of interest for field roles; (3) A description of some of the Army groups with charters in the robotics research and development areas; and (4) A description of two materiel handling, field oriented, robotics demonstration systems. GRA

N85-11996# General Accounting Office, Washington, D. C. National Security and International Affairs Div.
LOGISTICS SUPPORT COSTS FOR THE B-1B AIRCRAFT CAN BE REDUCED
20 Sep. 1984 49 p
(AD-A145846; GAO/NSIAD-84-36) Avail: NTIS HC A03/MF A01 CSCL 14/4

While the Air Force's logistics support planning for the B-1 bomber has been extensive, the inadequacy of the logistics data developed during research and development of the B-1B's predecessor-the B-1A-and the concurrent development and production schedule necessitated by a congressional mandate that the aircraft be operational not later than 1987 have forced Air Force planners to make logistics support decisions before they had sufficient data to support them. This has increased the risk that operating and support costs will be more than they would have been had normal Defense development procedures been employed before starting production. GAO has identified opportunities to reduce these costs which should be considered. They are: (1) combining the purchase of investment spares (components that can be repaired and reused) with the purchase of production components; (2) buying spares directly from the manufacturers instead of through the four B-1B contractors; (3) reducing the number of bases from four to three; and (4) centralizing all avionics maintenance repair at the B-1B airframe and engine depot repair facility and not establishing any repair shops at the planned B-1B bases. GRA

N85-11997# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
FOR THE SACRED AIR SPACE OF OUR MOTHERLAND; AN INTERVIEW WITH OUR COUNTRY'S FAMOUS AIRCRAFT DESIGNER, LU HSIAO-PENG
C. Liang-Chin and K. Ching-Po 18 Sep. 1984 9 p Transl. into ENGLISH from Hangkong Zhishi (China), no. 8, Aug. 1983 p 2-3
(AD-A146291; FTD-ID(RS)T-0987-84) Avail: NTIS HC A02/MF A01 CSCL 01/3

The history of China's aircraft industry is discussed. The lives of some aircraft designers are discussed. R.J.F.

N85-11998# Joint Publications Research Service, Arlington, Va.
WEST EUROPE REPORT: SCIENCE AND TECHNOLOGY
24 Jan. 1984 78 p Transl. into ENGLISH from various Russian articles
(JPRS-WST-84-004) Avail: NTIS HC A05/MF A01

Reports on research and progress on West European science and technology are presented. Topics discussed include: aerospace

technology, the new Netherlands space program, future Swedish satellite launch site, and a review of Ariane countdown procedures. For individual titles, see N85-11999 through N85-12001.

N85-11999# Joint Publications Research Service, Arlington, Va.
FOKKER WANTS TO START NEW NETHERLANDS SPACE PROGRAM **c12**
Sjoerd vanderWerf *In its* West Europe Rept.: Sci. and Technol. (JPRS-WST-84-004) 24 Jan. 1984 p 1-4 Transl. into ENGLISH from NRC Handelsblad (Rotterdam), 7 Dec. 1983 p 11 (For primary document see N85-11998 03-01)
Avail: NTIS HC A05/MF A01

The West European space laboratory Spacelab remains of great importance in the future. The Fokker participation in the realization of the Spacelab project was an especially important segment: the scientific air lock in the root of the laboratory, with which instruments could be temporarily put into free space for any and all purposes, and then retrieved. The interest in the system will increase after its success during the Spacelab 1 mission. It is found that the lock is a thoroughly dependable component of Spacelab. E.A.K.

N85-12000# Joint Publications Research Service, Arlington, Va.
SWEDEN'S KIRUNA MAY BE FUTURE LAUNCH SITE FOR SATELLITES **c14**
Caj Noren *In its* West Europe Rept.: Sci. and Technol. (JPRS-WST-84-004) 24 Jan. 1984 p 5-6 Transl. into ENGLISH from Dagens Nyheter (Stockholm), 2 Dec. 1983 p 26 (For primary document see N85-11998 03-01)
Avail: NTIS HC A05/MF A01

The use of the Esrange rocket base outside Kiruna, Sweden for launching satellites weighing up to 500 kg is discussed. The question of where the spent rocket stages will fall back to Earth is considered. Satellites scheduled to be launched from Kiruna are listed. R.S.F.

N85-12001# Joint Publications Research Service, Arlington, Va.
VIEW OF ARIANE COUNTDOWN PROCEDURES, KOUROU LAUNCH FACILITIES **c15**
Alain Perez *In its* West Europe Rept.: Sci. and Technol. (JPRS-WST-84-004) 24 Jan. 1984 p 7-16 Transl. into ENGLISH from Ind. and Tech. (Paris), 10 Sep. 1983 p 74-83 (For primary document see N85-11998 03-01)
Avail: NTIS HC A05/MF A01

Various activities, ground support equipment, procedures, and challenges associated with the launching of Ariane are described. Ground crew responsibilities, launch windows, rocket propellants, and technical personnel are among the topics discussed. R.S.F.

N85-12002# Joint Publications Research Service, Arlington, Va.
USSR REPORT: TRANSPORTATION
4 Oct. 1984 101 p Transl. into ENGLISH from various Russian articles
(JPRS-UTR-84-028) Avail: NTIS HC A06/MF A01

Aspects of Soviet civil aviation covered include ground and air traffic control systems, aircraft maintenance; and the effects of lightning on aircraft systems. Highway construction, motor vehicles, flood control, navigation of inland waterways, and shipbuilding activities are also discussed. For individual titles, see N85-12003 through N85-12007.

N85-12003# Joint Publications Research Service, Arlington, Va.
MINISTRY WANTS BETTER COMMO FACILITIES FOR AGROAVIATION **c32**
In its USSR Rept.: Transportation (JPRS-UTR-84-028) 4 Oct. 1984 Transl. into ENGLISH from Vozdushnyy Transp. (Moscow), 25 Aug. 1984 p 2 (For primary document see N85-12002 03-01)
Avail: NTIS HC A06/MF A01

A decree was issued making it incumbent upon managers of both territorial administrations and those in the ministry's central organization to take the necessary steps to further improve radio communications support for aircraft operations in the national economy. The problem of stocks of uninstalled costly radio and electrical equipment at aviation enterprises was investigated and a decree was also issued mandating installation and operation of this equipment. Penalties for noncompliance were established. A.R.H.

N85-12004# Joint Publications Research Service, Arlington, Va.
EDITORIAL URGES IMPROVED AVIATION REPAIR WORK QUALITY
In its USSR Rept.: Transportation (JPRS-UTR-84-028) 4 Oct. 1984 p 3-5 Transl. into ENGLISH from Vozdushnyy Transp. (Moscow), 25 Aug. 1984 p 1 (For primary document see N85-12002 03-01)
Avail: NTIS HC A06/MF A01

The multithousand member collective of aviation repair enterprises is voluntarily toiling on fulfillment of the tasks assigned it. The plan for the first 6 months of 1984 was fulfilled with good economic and financial indicators. In amount of realized output by 103 percent, in commodity output volume by 101.8 percent. Labor productivity exceeded the plan task by 3.2 percent and the reduction in prime production costs exceeded it by 3.7 percent. Almost 90 percent of the growth in output volume came from raising labor productivity. However, in the matter of insuring quality of aviation repair, there are still serious deficiencies and omissions. A number of substantiated complaints were made against plants No.'s 403, 411, 421 and 21. As checks made at the civil aviation plants have indicated, the main causes of these deficiencies were violations of the technology, poor technical training of operators, poor production rhythm, and lack of responsive monitoring on the part of OTK's. And not everywhere has discipline been well established. And where its levels has fallen and where slackness and irresponsibility are manifested, the resulting defects lead to material and psychological harm. A.R.H.

N85-12005# Joint Publications Research Service, Arlington, Va.
STUDY OF EFFECTS OF LIGHTNING ON AIRCRAFT SYSTEMS STRESSED **c03**
Yu. Kobzarev and M. Aleksandrov *In its* USSR Rept.: Transportation (JPRS-UTR-84-028) 4 Oct. 1984 p 6-8 Transl. into ENGLISH from Vozdushnyy Transp. (Moscow), 25 Aug. 1984 p 3 (For primary document see N85-12002 03-01)
Avail: NTIS HC A06/MF A01

Interferences from lightning discharges can be used for practical purposes. Determining the distance and direction to the source of the radio waves (lightning) enables finding the position of dangerous thunderstorm cells. There is need for equipment to prevent aircraft from getting into atmospheric areas where serious negative effects are possible. Microelectronics can provide a solution to this problem. Algorithms were developed for processing received signals and sensors were designed. All that is needed is a single set of airborne equipment which would consist of several sensors, a computer complex linked with the onboard radar, and one colored indicator for information output to the crew about all dangerous weather along the aircraft's route. A.R.H.

N85-12006# Joint Publications Research Service, Arlington, Va.
NEW AIRPORT GROUND TRAFFIC CONTROL SYSTEM PLANNED **c04**
G. Grishayeva *In its* USSR Rept.: Transportation (JPRS-UTR-84-029) 4 Oct. 1984 p 9-11 Transl. into ENGLISH from Vozdushnyy Transp. (Moscow), 5 Jul. 1984 p 3 (For primary document see N85-12002 03-01)
Avail: NTIS HC A06/MF A01

Flights under ICAO category 3 weather conditions require the use of technically more improved lighting and radar facilities. Recessed green lights situated at the centerline at 15-meter intervals in straight sections of taxiways and at intervals of 7.5 meters on curves produce a beam of light readily visible to pilots because they are installed in a bored cylindrical opening in the taxiways concrete. Scanning radar enables the ground controller in the airport tower to see both the runways and the taxiways as well as the aircraft and special vehicles on them. A graphic panel of the taxiway lighting system produces a true picture of the signal lighting. A diagram of the airport is situated next to

the radar scope. In case of any malfunction, the controller is warned and the nature and location of the malfunction is indicated. A.R.H.

N85-12007# Joint Publications Research Service, Arlington, Va.
START-2 ATC SYSTEM INSTALLATION PROGRESSES AT LENINGRAD c04
V. Senin *In its* USSR Rept.: Transportation (JPRS-UTR-84-028) 4 Oct. 1984 p 12-13 Transl. into ENGLISH from Pravda (Moscow), 6 Jul. 1984 p 6 (For primary document see N85-12002 03-01)
Avail: NTIS HC A06/MF A01

The technical re-equipment of Pulkovo Airport is continuing: a third runway is operating, and an experimental automated system for refueling aircraft is being built. The air traffic control service also is being filled with electronic technology. The widely known Start system now controls the movements of 36 airliners simultaneously. In the summer flight period, Pulkovo handles up to 200 arriving aircraft and the same number of departing aircraft. It is difficult for the air traffic control service: so many arriving and departing aircraft must be accommodated, they must be separated by air corridors and directed to follow a closely controlled course. The Start-2 system permits traffic control in the area of two or three airports and controls movements of up to 100 aircraft simultaneously. The system collects, processes, and represents full data on the aircraft from takeoff to departure from the ATC area. The system can photograph and record on tape the movement of aircraft in the approach and landing zones. A.R.H.

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N85-12008*# GMAF, Inc., Freeport, N.Y.
INVERSE DESIGN TECHNIQUE FOR CASCADES Final Report
Luca Zannetti and Maurizio Pandolfi Washington NASA Nov. 1984 33 p refs
(Contract NAS3-22772)
(NASA-CR-3836; E-2275; NAS 1.26:3836) Avail: NTIS HC A03/MF A01 CSCL 01A

A numerical technique to generate cascades is presented. The basic prescribed parameters are: inlet angle, exit pressure, and distribution of blade thickness and lift along a blade. Other sets of parameters are also discussed. The technique is based on the lambda scheme. The problem of stability of the computation as a function of the prescribed set of parameters and the treatment of boundary conditions is discussed. A one dimensional analysis to indicate a possible way for assuring stability for any two dimensional calculation is provided. E.A.K.

N85-12009*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Aerospace and Ocean Engineering.
THE LATERAL-DIRECTIONAL CHARACTERISTICS OF A 74-DEGREE DELTA WING EMPLOYING GOTHIC PLANFORM VORTEX FLAPS
Arthur C. Grantz Washington NASA Nov. 1984 146 p refs
(Grant NGT-47-004-802)
(NASA-CR-3848; NAS 1.26:3848) Avail: NTIS HC A07/MF A01 CSCL 01A

The low speed lateral/directional characteristics of a generic 74 degree delta wing body configuration employing the latest generation, gothic planform vortex flaps was determined. Longitudinal effects are also presented. The data are compared with theoretical estimates from VORSTAB, an extension of the Quasi vortex lattice Method of Lan which empirically accounts for vortex breakdown effects in the calculation of longitudinal and lateral/directional aerodynamic characteristics. It is indicated that leading edge deflections of 30 and 40 degrees reduce the magnitude of the wing effective dihedral relative to the baseline for a specified angle of attack or lift coefficient. For angles of attack greater than 15 degrees, these flap deflections reduce the configuration directional stability despite improved vertical tail effectiveness. It is shown that asymmetric leading edge deflections are inferior to conventional ailerons in generating rolling moments. VORSTAB calculations provide coarse lateral/directional estimates at low to moderate angles of attack. The theory does not account for vortex flow induced, vertical tail effects. E.A.K.

N85-12010# National Aerospace Lab., Tokyo (Japan).
NAVIER-STOKES SOLUTION OF 3-DIMENSIONAL HYPERSONIC AFTERBODY FLOWFIELDS OVER CAPSULE-TYPE VEHICLES Abstract Only
Jun. 1984 31 p refs In JAPANESE; ENGLISH summary
(NAL-TR-819; ISSN-0389-4010) Avail: NTIS HC A03/MF A01

The thin-layer, three-dimensional compressible Navier-Stokes equations are solved for hypersonic afterbody flowfields over capsule-type reentry vehicles at high angles of attack. In such flow fields, large streamwise and cross flow separations occur and embedded shock waves also appear. In order to analyze these complicated flowfields, exact numerical viscous flow simulations are more appropriate. In this report, an implicit approximate factorization method has been used to obtain numerical solutions under the following free stream condition: free stream Mach number of 7.0 with Reynolds number of 4.5 10 to the 5th power, which is the same condition as in the hypersonic wind tunnel at the National Aerospace Laboratory. Body configurations are composed of a blunt-nosed forebody and 20 deg conical afterbody followed by a cylinder. The results demonstrate the capability of the present numerical procedure for investigating the detailed structure of such three-dimensional separations and the effects of afterbody to the total aerodynamic performance. Author

N85-12011*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
WIND TUNNEL WALL INTERFERENCE ASSESSMENT AND CORRECTION, 1983
Perry A. Newman, ed. and Richard W. Barnwell, ed. Washington 1984 417 p refs Workshop held in Hampton, Va., 25-26 Jan. 1983
(NASA-CP-2319; L-15812; NAS 1.55:2319) Avail: NTIS HC A18/MF A01 CSCL 01A

Technical information focused upon emerging wall interference assessment/correction (WIAC) techniques applicable to transonic wind tunnels with conventional and passively or partially adapted walls is given. The possibility of improving the assessment and correction of data taken in conventional transonic wind tunnels by utilizing simultaneously obtained flow field data (generally taken near the walls) appears to offer a larger, nearer-term payoff than the fully adaptive wall concept. Development of WIAC procedures continues, and aspects related to validating the concept need to be addressed. Thus, the scope of wall interference topics discussed was somewhat limited. For individual titles, see N85-12012 through N85-12035.

N85-12012*# Boeing Commercial Airplane Co., Seattle, Wash.
WALL INTERFERENCE MEASUREMENTS FOR THREE-DIMENSIONAL MODELS IN TRANSONIC WIND TUNNELS: EXPERIMENTAL DIFFICULTIES
R. L. Bengelink and N. J. Zinserling *In* NASA. Langley Research Center Wind Tunnel Wall Interference Assessment and Correction, 1983 1984 p 21-42 refs (For primary document see N85-12011 03-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

The purpose is not to provide a detailed discussion of several wall interference experiments, but rather to use these experiments (recently accomplished in the Boeing Transonic Wind Tunnel (BTWT) to illustrate the problems associated with many of the measurements required by current wall interference assessment/correction (WIAC) procedures. The wall correction to lift is emphasized. It is shown that, because conventional tunnels and relatively small models continue to be used, the flow field or flow

boundary measurements to be made impose severe requirements on the experiment itself. In some cases, existing instrumentation and test techniques may not be adequate to obtain the data accuracies needed. R.J.F.

N85-12013*# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
SURVEY OF ONERA ACTIVITIES ON ADAPTIVE-WALL APPLICATIONS AND COMPUTATION OF RESIDUAL CORRECTIONS
J. P. Chevallier *In* NASA. Langley Research Center Wind Tunnel Wall Interference Assessment and Correction, 1983 1984 p 43-60 refs (For primary document see N85-12011 03-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

The research undertaken concerning the computation and/or reduction of wall interference follows two main axes: improvement of wall correction determinations, and use of adaptive flexible walls. The use of wall-measured data to compute interference effects is reliable when the model representation is assessed by signatures with known boundary conditions. When the computed interferences are not easily applicable to correcting the results (especially for gradients in two-dimensional cases), the flexible adaptive walls in operation in T2 are an efficient and assessed means of reducing the boundary effects to a negligible level, if the direction and speed of the flow are accurately measured on the boundary. The extension of the use of adaptive walls to three-dimensional cases may be attempted since the residual corrections are assumed to be small and are computable. R.J.F.

N85-12014*# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany).
WIND TUNNEL WALL INTERFERENCE IN CLOSED, VENTILATED AND ADAPTIVE TEST SECTIONS
H. Holst *In* NASA. Langley Research Center Wind Tunnel Wall Interference Assessment and Correction, 1983 1984 p 61-78 refs (For primary document see N85-12011 03-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

A wall interference correction method for closed rectangular test sections was developed which uses measured wall pressures. Measurements with circular discs for blockage and a rectangular wing as a lift generator in a square closed test section validate this method. These measurements are intended to be a basis of comparison for measurements in the same tunnel using ventilated (in these case, slotted) walls. Using the vortex lattice method and homogeneous boundary conditions, calculations were performed which show sufficiently high pressure levels at the walls for correction purposes in test sections with porous walls. In Gottingen, an adaptive test section (which is a deformable rubber tube of 800 mm diameter) was built and a computer program was developed which is able to find the necessary wall adaptation for interference-free measurements in a single step. To check the program prior to the first run, the vortex lattice method was used to calculate wall pressure distributions in the nonadapted test section as input data for the one-step method. Comparison of the pressure distribution in the adapted test section with free-flight data shows nearly perfect agreement. An extension of the computer program can be made to evaluate the remaining interference corrections. R.J.F.

N85-12015*# Southampton Univ. (England). Dept. of Aeronautics and Astronautics.
TWO- AND THREE-DIMENSIONAL MODEL AND WALL DATA FROM A FLEXIBLE-WALLED TRANSONIC TEST SECTION
M. J. Goodyer and I. D. Cook *In* NASA. Langley Research Center Wind Tunnel Wall Interference Assessment and Correction, 1983 1984 p 79-88 refs Sponsored in part by the British Science and Engineering Research Council (For primary document see N85-12011 03-02)
(Grant NsG-7172)
Avail: NTIS HC A18/MF A01 CSCL 01A

Both two- and three-dimensional model testing is being carried out in the transonic flexible-walled wind tunnel test section. The test section has flexible top and bottom walls with rigid sidewalls. Interference is eliminated by adjustments based on data taken at walls in two dimensional models. Cast-7 data will illustrate agreement between various flexible-walled tunnels. In three-dimensional models interference cannot be eliminated but wall adjustments can control and relieve the principal sources of wall-induced errors. Estimates of magnitudes of the control which may be exercised on flow by movement of one wall jack are presented. A wall control algorithm (still in analytic development stage) based on use of this data is described. Brief examples of control of wall-induced perturbations in region of model are given. B.W.

N85-12016*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ASSESSMENT OF LIFT- AND BLOCKAGE-INDUCED WALL INTERFERENCE IN A THREE-DIMENSIONAL ADAPTIVE-WALL TUNNEL
Edward T. Schairer *In* NASA. Langley Research Center Wind Tunnel Wall Interference Assessment and Correction, 1983 1984 p 89-100 refs (For primary document see N85-12011 03-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

A three-dimensional adaptive-wall wind tunnel experiment was conducted at Ames Research Center. This experiment demonstrated the effects of wall interference on the upwash distribution on an imaginary surface surrounding a lifting wing. This presentation demonstrates how the interference assessment procedure used in the adaptive-wall experiments to determine the wall adjustments can be used to separately assess lift- and blockage-induced wall interference in a passive-wall wind tunnel. The effects of lift interference on the upwash distribution and on the model lift coefficient are interpreted by a simple horseshoe vortex analysis. Author

N85-12017*# Calspan Field Services, Inc., Arnold Air Force Station, Tenn.
A DATA BASE FOR THREE-DIMENSIONAL ALL-INTERFERENCE CODE EVALUATION
W. L. Sickles *In* NASA. Langley Research Center Wind Tunnel Wall Interference Assessment and Correction, 1983 1984 p 101-118 ref (For primary document see N85-12011 03-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

A validation of a measured boundary condition technique was carried out to demonstrate the feasibility of a wall interference assessment/correction (WIAC) system. An experimental evaluation was also carried out to compare performances of various techniques, to define the number of necessary boundary measurements for accurate assessment/corrections and to define the envelope of test conditions for which accurate assessment/corrections are achieved. The relative merits of a WIAC system and an adaptive wall tunnel are compared. The measurement surface boundary data is performed with a system of two rotating pipes. These pipes sweep out a cylindrical measurement surface near the tunnel walls, approximately one inch from the wall at the closest point. The experimental model was specially designed and fabricated for the adaptive wall experiments. The model is a wing/tail/body configuration with swept lifting surface. The boundary data taken in Tunnel 1T with the rotating pipe system has been shown to offer several attractive features for WIAC code evaluation. Good spatial resolution of measurements is achieved and measurements are made upstream and downstream of the model. Also, two velocity components are determined. B.W.

N85-12018*# Tennessee Univ. Space Inst., Tullahoma.
INVESTIGATIONS OF FLOW FIELD PERTURBATIONS INDUCED ON SLOTTED TRANSONIC-TUNNEL WALLS
J. M. Wu and F. G. Collins *In* NASA. Langley Research Center Wind Tunnel Wall Interference Assessment and Correction, 1983 1984 p 119-142 refs (For primary document see N85-12011 03-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

The free-stream interference caused by the flow through the slotted walls of the test sections of transonic wind tunnels has continuously a problem in transonic tunnel testing. The adaptive-wall transonic tunnel is designed to actively control the near-wall

boundary conditions by sucking or blowing through the wall. In order to make the adaptive-wall concept work, parameters for computational boundary conditions must be known. These parameters must be measured with sufficient accuracy to allow numerical convergence of the flow field computations and must be measured in an inviscid region away from the model that is placed inside the wind tunnel. The near-wall flow field was mapped in detail using a five-port cone probe that was traversed in a plane transverse to the free-stream flow. The initial experiments were made using a single slot and recent measurements used multiple slots, all with the tunnel empty. The projection of the flow field velocity vectors on the transverse plane revealed the presence of a vortex-like flow with vorticity in the free stream. The current research involves the measurement of the flow field above a multislotted system with segmented plenums behind it, in which the flow is controlled through several plenums simultaneously. This system would be used to control a three-dimensional flow field.
B.W.

N85-12019*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECT OF UPSTREAM SIDEWALL BOUNDARY LAYER REMOVAL ON AN AIRFOIL TEST
C. B. Johnson, A. V. Murthy, E. J. Ray, P. L. Lawing, and J. J. Thibodeaux *In its* Wind Tunnel Wall Interference Assessment and Correction, 1983 1984 p 143-163 refs (For primary document see N85-12011 03-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

Sidewall boundary layer effects were investigated by applying partial upstream sidewall boundary layer removal in the Langley 0.3-m transonic cryogenic tunnel. Over the range of sidewall boundary layer displacement thickness of these tests the influence on pressure distribution was found to be small for subcritical conditions; however, for supercritical conditions the shock position was affected by the sidewall boundary layer. For these tests (with and without boundary layer remove) comparisons with predictions of the GRUMFOIL computer code indicated that Mach number corrections due to the sidewall boundary layer improve the agreement for both subcritical and supercritical conditions. The results also show that sidewall boundary layer removal reduces the magnitude of the sidewall correction; however, a suitable correction must still be made.
R.S.F.

N85-12020*# Ohio State Univ., Columbus.
PERFORMANCE OF TWO TRANSONIC AIRFOIL WIND TUNNELS UTILIZING LIMITED VENTILATION
J. D. Lee and G. M. Gregorek *In* NASA. Langley Research Center Wind Tunnel Wall Interference Assessment and Correction, 1983 1984 p 165-170 (For primary document see N85-12011 03-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

A limited-zone ventilated wall panel was developed for a closed-wall icing tunnel which permitted correct simulation of transonic flow over model rotor airfoil sections with and without ice accretions. Candidate porous panels were tested in the Ohio State University 6- x 12-inch transonic airfoil tunnel and result in essentially interference-free flow, as evidenced by pressure distributions over a NACA 0012 airfoil for Mach numbers up to 0.75. Application to the NRC 12- x 12-inch icing tunnel showed a similar result, which allowed proper transonic flow simulation in that tunnel over its full speed range.
Author

N85-12021*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EXPERIMENTS SUITABLE FOR WIND TUNNEL WALL INTERFERENCE ASSESSMENT/CORRECTION
Joseph G. Marvin *In* NASA. Langley Research Center Wind Tunnel Wall Interference Assessment and Correction, 1983 1984 p 171-190 refs (For primary document see N85-12011 03-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

Three experiments suitable for wall interference assessment and evaluation of proposed correction methods are presented. The experiments are: (1) a series of airfoil tests using a newly designed transonic flow facility that employs side-wall boundary layer suction and upper- and lower-wall shaping; (2) tests on a swept airfoil section spanning a solid-wall wind tunnel with fixed contouring on all four walls; and (3) tests on a swept wing of aspect ratio 3 mounted in a solid-wall wind tunnel with fixed flat walls. Each of the experiments provides data on the airfoil sections as well as on the wind tunnel walls. All the experiments were performed in solid wall wind tunnels corrected for boundary layer displacement effects. Although the experiments were performed primarily to evaluate computer code performance, it is believed that they also provide information that can be used to evaluate methods for assessing and correcting wall interference effects.
R.S.F.

N85-12022*# Rockwell International Science Center, Thousand Oaks, Calif.
ASYMPTOTIC METHODS FOR WIND TUNNEL WALL CORRECTIONS AT TRANSONIC SPEED
N. D. Malmuth, J. D. Cole, and F. Zeigler *In* NASA. Langley Research Center Wind Tunnel Wall Interference Assessment and Correction, 1983 1984 p 193-203 (For primary document see N85-12011 03-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

The effort to develop classical methods to compute wall interference at transonic speeds is outlined. The two-dimensional theory and three-dimensional development are discussed. Also, some numerical application of the two-dimensional work are indicated. The basic advantages of the asymptotic theory are noted.
R.S.F.

N85-12023*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECT OF BOUNDARY LAYERS ON SOLID WALLS IN THREE-DIMENSIONAL SUBSONIC WIND TUNNELS
Jerry B. Adcock and Richard W. Barnwell *In its* Wind Tunnel Wall Interference Assessment and Correction, 1983 1984 p 205-218 refs (For primary document see N85-12011 03-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

A solution for the tunnel wall boundary layer effects for three-dimensional subsonic tunnels is presented. The model potentials are represented with simple singularities placed on the centerline of the tunnel and Laplace's equation in cylindrical coordinates is solved for either the conventional homogeneous slotted-wall boundary condition, the solid-wall viscous boundary condition, or a combination of them. The most pronounced wall boundary layer effect is on solid blockage for completely closed wind tunnels. Boundary layers on the wall reduce the blockage from the solid-wall, no-boundary-layer case in a manner similar to opening slots in a solid wall. Additionally, for solid-wall tunnel configurations, the streamline curvature interference factor is reduced by a significant amount, whereas the lift interference factor at the model station does not depend on the boundary layer parameter. For combination wall configurations, the slot effect of the horizontal walls dominates the viscous effect of the solid sidewalls.
R.S.F.

N85-12024*# National Aerospace Lab., Amsterdam (Netherlands).
NLR ACTIVITIES IN THE FIELD OF WIND TUNNEL WALL INTERFERENCE
J. Smith *In* NASA. Langley Research Center Wind Tunnel Wall Interference Assessment and Correction, 1983 1984 p 221-229 refs (For primary document see N85-12011 03-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

Measured field data as a boundary condition for calculating the interference flow field were applied. They are divided into two categories. In the first category, the field data must consist of distributions of a single velocity component, and an accurate estimate of the hypothetical free air contribution of the model to this component is required. The differences between measured values and estimated model contributions are attributed to wall interference and they establish the boundary condition. The associated field data measurements are simple, yet the necessary model representation generally is a serious drawback. The second

category requires field data which consist of velocity vector distributions at the price of multicomponent measurements, but at the profit that no information at all is required about the model. In solid wall test sections, the price is reduced to virtually zero but the profit remains. E.A.K.

N85-12025*# National Aeronautical Establishment, Ottawa (Ontario).
PROGRESS IN WIND TUNNEL WALL INTERFERENCE ASSESSMENT/CORRECTION PROCEDURES AT THE NAE
L. H. Ohman, M. Mokry, and Y. Y. Chan *In* NASA. Langley Research Center Wind Tunnel Wall Interference Assessment and Correction, 1983 1984 p 231-257 refs (For primary document see N85-12011 03-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

Wall corrections as a function of wall porosity in the transonic wall interference problem was assessed. Effective porosities primarily for the two dimensional case were established as follows: (1) comparison of experimental data for two geometrically similar models of different chord/height ratio, an overall value of wall porosity could be deduced; (2) theoretical development which allows for unequal porosity for the floor and ceiling and wall boundary pressure measurements, porosities for floor and ceiling could be deduced; (3) a scheme was developed which allowed unequal porosity of floor and ceiling and streamwise varying porosity. The boundary layer development along the perforated floor and ceiling under the influence of the model pressure field, variations in boundary layer thickness underlining the difficulties in deducing meaningful values of wall porosity were determined. Wall boundary pressure measurement, in combination with singularity modelling of the airfoil, was sufficient to yield required information on the wall interference flow without having to establish some value for wall porosity. The singularity modelling of the airfoil initially covered only lift and volume but was extended to include drag and pitching moment, and second order volume term. It is shown by asymptotic transonic small disturbance analysis, that the derived corrections to angle of attack and free stream Mach number are correct to the first order. E.A.K.

N85-12026*# Royal Aircraft Establishment, Bedford (England).
DEVELOPMENT IN UK OF A METHOD FOR CALCULATING TUNNEL WALL CORRECTIONS FROM FLOW MEASUREMENTS
P. R. Ashill *In* NASA. Langley Research Center Wind Tunnel Wall Interference Assessment and Correction, 1983 1984 p 259-271 refs (For primary document see N85-12011 03-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

Classical methods for calculation of wall corrections which are not satisfactory for a number of flows of interest are discussed. To meet these objections, a number of methods were developed which use measurements of the low at or close to the tunnel walls as an outer boundary condition to define wall interference. The development, assessment and application of one such method is summarized. E.A.K.

N85-12027*# Lockheed-Georgia Co., Marietta.
TUNNEL CONSTRAINT FOR A JET IN CROSSFLOW
D. J. Wilsden and J. E. Hackett *In* NASA. Langley Research Center. Wind Tunnel Wall Interference Assessment and Correction, 1983 1984 p 273-290 refs (For primary document see N85-12011 03-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

A facet of a unified tunnel correction scheme which uses wall pressures to determine tunnel induced blockage and upwash is described. With this method, there is usually no need to use data concerning model forces or power settings to find the interference; it follows directly from the pressures and tunnel dimensions. However, highly inclined jets do not produce good pressure signatures and are highly three dimensional, so they must be treated differently. Flow modeling is also discussed. E.A.K.

N85-12028*# Royal Inst. of Tech., Stockholm (Sweden).
INTERFERENCE FROM SLOTTED WALLS
Sune B. Berndt *In* NASA. Langley Research Center Wind Tunnel Wall Interference Assessment and Correction, 1983 1984 p 293-300 refs (For primary document see N85-12011 03-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

Wall interference is made predominant in tunnel models and by wall geometries to facilitate the study of slot flow. The viscous effects in slots are studied by two dimensional measurements of flow. Wall interference is assessed by measuring pressure distributions at two levels near the walls. Interference on lifting delta wings is calculated. Pressure distributions at inner boundaries show basis axisymetries between the pressure side and the suction side, pointing to the necessity of having wider slots on the pressure side. E.R.

N85-12029*# Flow Research, Inc., Kent, Wash. Research and Technology Div.
WIND TUNNEL WALL INTERFERENCE CORRECTION FOR AIRCRAFT MODELS
M. H. Rizk, M. G. Smithmeyer, and E. M. Murman (MIT) *In* NASA. Langley Research Center. Wind Tunnel Wall Interference Assessment and Correction, 1983 1984 p 301-322 refs (For primary document see N85-12011 03-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

Wall interference correction procedures seek to determine the required changes in certain flow or geometric parameters so that the difference between the flow properties at the model's surface in the tunnel and free air are minimized. A transonic and a linear correction procedure were developed for aircraft models. In addition to Mach number and angle of attack corrections, an estimate of the accuracy of the corrections is provided by the transonic correction procedure. Lift, pitching moment and pressure measurements near the tunnel walls are required. The efficiency and accuracy of the correction procedure are improved. Moreover, correction of both the wing and tail angles of attack is allowed. The procedure is valid for transonic as well as subcritical flows. However, for subcritical flows further approximations and simplifying assumptions are made, leading to a very simple and efficient correction procedure. Author

N85-12030*# Virginia Associated Research Center, Newport News.
AN INERFERENCE ASSESSMENT APPROACH FOR A THREE-DIMENSIONAL SLOTTED TUNNEL WITH SPARSE WALL PRESSURE DATA
William B. Kemp, Jr. *In* NASA. Langley Research Center. Wind Tunnel Wall Interference Assessment and Correction, 1983 1984 p 323-334 refs (For primary document see N85-12011 03-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

The various procedures referred to as wall interference assessment and correction procedures presume the existence of a surface distribution of data (usually static pressure) measured over a surface on or near the tunnel walls for each test point to be assessed. An alternative approach in which a reasonably sophisticated computer model of the test section flow would be fitted parametrically to a sparse set of measured data is presented. The measurements provides line distributions of static pressure near the center lines of the top, side and bottom walls. The development of a test section model incorporating explicit recognition of discrete slots of finite length with controlled flow reentry into the solid wall downstream portion of the tunnel is shown. Author

N85-12031*# Calspan Field Services, Inc., Arnold Air Force Station, Tenn.
DETERMINATION OF EQUIVALENT MODEL GEOMETRY FOR TUNNEL WALL INTERFERENCE ASSESSMENT/CORRECTION
C. F. Lo *In* NASA. Langley Research Center Wind Tunnel Wall Interference Assessment and Correction, 1983 1984 p 335-342 (For primary document see N85-12011 03-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

A formula for the determination of equivalent model geometry with two variables measured at the interface is derived, based on two dimensional subsonic flow. This predicted model profile is a

reasonable initial estimate for transonic flow as long as the sonic region does not reach the interface. A general formula is given in two forms. One is in terms of complex variable functions and the other is an integral equation. The complex-function formula has the advantage of using analytic expressions. The integral equation form requires a numerical solution after assuming the model geometry as a polynomial function. Examples are given to illustrate the application of the formulas. Author

N85-12032*# Naval Ship Research and Development Center, Bethesda, Md.

EXPERIENCES WITH A HIGH-BLOCKAGE MODEL TESTED IN THE NASA AMES 12-FOOT PRESSURE WIND TUNNEL

David W. Coder *In* NASA. Langley Research Center Wind Tunnel Wall Interference Assessment and Correction, 1983 1984 p 345-360 refs (For primary document see N85-12011 03-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

Representation of the flow around full-scale ships was sought in the subsonic wind tunnels in order to a Hain Reynolds numbers as high as possible. As part of the quest to attain the largest possible Reynolds number, large models with high blockage are used which result in significant wall interference effects. Some experiences with such a high blockage model tested in the NASA Ames 12-foot pressure wind tunnel are summarized. The main results of the experiment relating to wind tunnel wall interference effects are also presented. B.G.

N85-12033*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

REVIEW OF THE ADVANCED TECHNOLOGY AIRFOIL TEST PROGRAM IN THE 0.3-METER TRANSONIC CRYOGENIC TUNNEL

E. J. Kay and C. L. Ladson *In its* Wind Tunnel Wall Interference Assessment and Correction, 1983 1984 p 361-374 refs (For primary document see N85-12011 03-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

The following areas were addressed: interchangeable test sections in the 0.3-M Transonic Cryogenic Tunnel (TCT); typical airfoil installation; airfoil capability; advanced technology airfoil test (ATAT); effects of the Reynolds number on the normal force coefficient; effects of the Reynolds number on the drag coefficient; and comparison of experimental results with theory. B.G.

N85-12034*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

SOME EXPERIENCE WITH BARNWELL-SEWALL TYPE CORRECTION TO TWO-DIMENSIONAL AIRFOIL DATA

Renaldo V. Jenkins *In its* Wind Tunnel Wall Interference Assessment and Correction, 1983 1984 p 375-392 refs (For primary document see N85-12011 03-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

A series of airfoils were tested in the Langley 0.3-Meter Transonic Cryogenic Tunnel (TCT) at Reynolds numbers from 2 to 50 million. The 0.3-m TCT is equipped with Barnwell slots designed to minimize blockage due to the tunnel flow and ceiling. This design suggests that sidewall corrections for blockage is needed, and that a lifting airfoil produces a change in angle of attack. Sidewall correction methods were developed for subsonic and subsonic-transonic flow. Comparisons of theory with experimental data obtained in the 0.3-m TCT for two airfoils, the British NPL 9510 and the German R-4 are presented. The NPL 9510 was tested as part of the NASA/United Kingdom Joint Aeronautical Program and R-4 was tested as part f the DFVLR/NASA Advanced Airfoil Research Program. For the NPL 9510 airfoil, only those test points that one would anticipate being difficult to predict theoretically are presented. B.G.

N85-12035*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

ADAPTATION OF A FOUR-WALL INTERFERENCE ASSESSMENT/CORRECTION PROCEDURE FOR AIRFOIL TESTS IN THE 0.3-m TCT

Clyde R. Gumbert, Perry A. Newman, William B. Kemp, Jr., and Jerry B. Adcock *In its* Wind Tunnel Wall Interference Assessment and Correction, 1983 1984 p 393-414 refs (For primary document see N85-12011 03-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

Based upon limited, initial observations of wall interference corrections obtained for one airfoil test, there is a need for assessing the upstream flow direction. If there is no direct measurement then a two-pass correction procedure similar to the one described here is required. Questions have arisen pertaining to the correct interpretation of the pressure coefficients measured on the slats of a slotted tunnel wall, the interpretation of just what the calculated equivalent body encompasses or should include, and what can or should be considered as quantitative criteria for data correctability. Further studies using this modified procedure will address these questions. Hopefully, a meaningful WIAC procedure can be validated for the airfoil tests in the 0.3-m TCT. Author

N85-12036*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

MODEL EQUATION FOR SIMULATING FLOWS IN MULTISTAGE TURBOMACHINERY

John J. Adamczyk Nov. 1984 37 p refs
(NASA-TM-86869; E-2291; NAS 1.15:86869) Avail: NTIS HC A03/MF A01 CSCL 01A

A steady, three-dimensional average-passage equation system is derived for use in simulating multistage turbomachinery flows. These equations describe a steady, viscous flow that is periodic from blade passage to blade passage. From this system of equations, various reduced forms can be derived for use in simulating the three-dimensional flow field within multistage machinery. It is suggested that a properly scaled form of the average-passage equation system would provide an improved mathematical model for simulating the flow in multistage machines at design and, in particular, at off-design conditions. Author

N85-12037*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

STATUS AND PROSPECTS OF COMPUTATIONAL FLUID DYNAMICS FOR UNSTEADY TRANSONIC VISCOUS FLOWS

W. J. McCroskey, P. Kutler, and J. O. Bridgeman Oct. 1984 27 p refs Sponsored in part by Army
(NASA-TM-86018; A-9877; USAAVSCOM-TM-84-A-8; NAS 1.15:86018) Avail: NTIS HC A03/MF A01 CSCL 01A

Applications of computational aerodynamics to aeronautical research, design, and analysis have increased rapidly over the past decade, and these applications offer significant benefits to aeroelasticians. The past developments are traced by means of a number of specific examples, and the trends are projected over the next several years. The crucial factors that limit the present capabilities for unsteady analyses are identified; they include computer speed and memory, algorithm and solution methods, grid generation, turbulence modeling, vortex modeling, data processing, and coupling of the aerodynamic and structural dynamic analyses. The prospects for overcoming these limitations are presented, and many improvements appear to be readily attainable. If so, a complete and reliable numerical simulation of the unsteady, transonic viscous flow around a realistic fighter aircraft configuration could become possible within the next decade. The possibilities of using artificial intelligence concepts to hasten the achievement of this goal are also discussed. Author

N85-12038*# United Technologies Research Center, East Hartford, Conn.

EXTENDED AEROELASTIC ANALYSIS FOR HELICOPTER ROTORS WITH PRESCRIBED HUB MOTION AND BLADE APPENDED PENDULUUM VIBRATION ABSORBERS

Richard L. Bielawa Dec. 1984 217 p refs
(Contract NAS1-16803)
(NASA-CR-172455; NAS 1.26:172455) Avail: NTIS HC A10/MF A01 CSCL 01A

The mathematical development for the expanded capabilities of the G400 rotor aeroelastic analysis was examined. The G400PA

expanded analysis simulates the dynamics of all conventional rotors, blade pendulum vibration absorbers, and the higher harmonic excitations resulting from prescribed vibratory hub motions and higher harmonic blade pitch control. The methodology for modeling the unsteady stalled airloads of two dimensional airfoils is discussed. Formulations for calculating the rotor impedance matrix appropriate to the higher harmonic blade excitations are outlined. This impedance matrix, and the associated vibratory hub loads, are the rotor dynamic characteristic elements for use in the simplified coupled rotor/fuselage vibration analysis (SIMVIB). Updates to the development of the original G400 theory, program documentation, user instructions and information are presented.
E.A.K.

N85-12039*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
INCOMPRESSIBLE LIFTING-SURFACE AERODYNAMICS FOR A ROTOR-STATOR COMBINATION
Sridhar M. Ramachandra Oct. 1984 32 p refs
(NASA-TM-83767; E-2258; NAS 1.15:83767) Avail: NTIS HC A03/MF A01 CSCL 01A

Current literature on the three dimensional flow through compressor cascades deals with a row of rotor blades in isolation. Since the distance between the rotor and stator is usually 10 to 20 percent of the blade chord, the aerodynamic interference between them has to be considered for a proper evaluation of the aerothermodynamic performance of the stage. A unified approach to the aerodynamics of the incompressible flow through a stage is presented that uses the lifting surface theory for a compressor cascade of arbitrary camber and thickness distribution. The effects of rotor stator interference are represented as a linear function of the rotor and stator flows separately. The loading distribution on the rotor and stator flows separately. The loading distribution on the rotor and stator blades and the interference factor are determined concurrently through a matrix iteration process.
Author

N85-12040*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
FLOW VISUALIZATION STUDY OF A VORTEX-WING INTERACTION
R. D. Mehta and T. T. Lim Nov. 1984 43 p refs Original contains color illustrations
(NASA-TM-86656; Rept-85013; NAS 1.15:86656) Avail: NTIS HC A03/MF A01 CSCL 01A

A flow visualization study in water was completed on the interaction of a streamwise vortex with a laminar boundary layer on a two-dimensional wing. The vortex was generated at the tip of a finite wing at incidence, mounted perpendicular to the main wing, and having the same chord as the main wing. The Reynolds number based on wing chord was about 5000. Two different visualization techniques were used. One involved the injection of two different colored dyes into the vortex and the boundary layer. The other technique utilized hydrogen bubbles as an indicator. The position of the vortex was varied in a directional normal to the wing. The angle of attack of the main wing was varied from -5 to +12.5 deg. The vortex induced noticeable cross flows in the wing boundary layer from a distance equivalent to 0.75 chords. When very close to the wing, the vortex entrained boundary layer fluid and caused a cross flow separation which resulted in a secondary vortex.
B.G.

N85-12041# Army Research and Technology Labs., Moffett Field, Calif. Aeromechanics Lab.
INTERACTION BETWEEN AN AIRFOIL AND A STREAMWISE VORTEX
K. W. McAlister and C. Tung 27 Jun. 1984 24 p
(AD-A145823) Avail: NTIS HC A02/MF A01 CSCL 20/4

The tip of a finite-span airfoil was used to generate a streamwise vortical flow, the strength of which could be varied by changing the incidence of the airfoil. The vortex that was generated traveled downstream and interacted with a second airfoil on which measurements of lift, drag, and pitching moment were made. The flow field, including the vortex core, was visualized in order to study the structural alterations to the vortex resulting form various levels of encounter with the downstream airfoil. These observations were also used to evaluate the accuracy of a theoretical model.
Author (GRA)

N85-12042# Naval Surface Weapons Center, White Oak, Md.
AN INVISCID COMPUTATIONAL METHOD FOR SUPERSONIC INLETS Final Report
A. B. Wardlaw, Jr., D. Shumway, and F. Baltakis 22 Mar. 1984 78 p
(AD-A145997; NSWC/TR-83-428) Avail: NTIS HC A05/MF A01 CSCL 20/4

An extension to the SWINT code is described which permits inviscid calculations to be performed on the supersonic portion of inlet flow fields. Also described is an interface program which rezones the external flow field applied to several examples. A listing of the extension to SWINT and the interface program are provided in the Appendices along with a set of user instructions and a sample case.
Author (GRA)

N85-12043# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Abteilung fuer Entwurfsaerodynamik.
DESIGN OF A BASIC AIRFOIL FOR A SLIGHTLY SWEPT WING. PART 1: THEORETICAL TRANSONIC AIRFOIL DESIGN
Georg Wichmann Mar. 1984 47 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-892)
(DFVLR-FB-84-19-Pt-1) Avail: NTIS HC A03/MF A01; DFVLR, Cologne DM 15,50

The design procedure of a basic airfoil for a slightly swept transport aircraft wing is described. It is shown that transonic wing technology reduces sweep by retaining wing thickness and cruise Mach number.
Author (ESA)

N85-12044# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Forschungsbereich Stroemungsmechanik.
EMPIRICAL FORMULAS FOR THE PREDICTION OF THE BASE PRESSURE OF MISSILE BODIES AT SUBSONIC VELOCITIES
Mauri Tanner Jun. 1984 3048 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-893)
(DFVLR-FB-84-23) Avail: NTIS HC A03/MF A01; DFVLR, Cologne DM 15

Empirical formulas to predict base pressure of missile bodies at subsonic speeds were derived for Reynolds number = 340,000. The formulas are valid for angles of incidence 0 to 20 deg arc for cylindrical and boattailed afterbodies. Mach numbers were varied between 0.50 and 0.90. Calculations and measured results show good agreement for cylindrical afterbodies, while for boattails discrepencies appear.
Author (ESA)

N85-12045# Rolls-Royce Ltd., Derby (England).
A FINITE ELEMENT METHOD FOR THE SOLUTION OF TWO-DIMENSIONAL TRANSONIC FLOWS IN CASCADES
D. S. Whitehead (Cambridge University) and S. G. Newton 1 Aug. 1984 38 p refs
(PNR-90216) Avail: NTIS HC A03/MF A01

Steady two-dimensional transonic flow was calculated in cascades of compressor and turbine blades using a mesh of triangular finite elements. A velocity potential is used, the equations being solved by the Newton-Raphson technique. The resulting computer program is fast, and is shown to give good accuracy. Shock waves are well represented, if they are not too strong. The method copies with supercritical designs. For supersonic inlet flows with shocks, the results are comparable with time-marching. The program can calculate the flow in a cascade of flat plates operating like tip sections of transonic fan blades in which the flow is spilling round the leading edge and the unique incidence condition does not apply.
Author (ESA)

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N85-12046# Boeing Commercial Airplane Co., Seattle, Wash. Flight Deck Research Dept.
FLIGHT PHASE STATUS MONITOR STUDY. PHASE 1: SYSTEMS CONCEPTS Final Report, Jun. 1983 - Jul. 1984
L. G. Summers, B. L. Berson, D. C. Hanson, and C. Rossi Jul. 1984 141 p refs
(Contract DTFA01-83-20033)
(DOT/FAA/PM-84/18) Avail: NTIS HC A07/MF A01

Phase I of a study conducted for the FAA to develop flight status monitor concepts is reported herein. Previous studies of crew alerting systems suggested the concept of a flight status monitor (FSM) which could monitor a flight, alert the crew to abnormal operations as well as aircraft system failures, and guide the crew through the appropriate response action procedures. The major Phase I activities include: (1) reviewing the results of Phase IV of the Aircraft Alerting System Standardization Study to identify the requirements for expanding the alerting system into an FSM; (2) developing preliminary FSM candidate concepts and identifying design issues relating to concept implementation; (3) performing a literature review to obtain data for answering design questions; (4) developing realistic demonstration scenarios, based upon previous accidents/incidents, to provide a mechanism for evaluating the candidate concepts; (5) implementing the FSM concepts and demonstration scenarios in a flight deck simulator for concept demonstration/evaluation; and (6) conducting demonstrations and developing a questionnaire to solicit pilot comments/opinions for refining the candidate concepts and to provide data for resolving FSM implementation issues. Author

N85-12005# Joint Publications Research Service, Arlington, Va.
STUDY OF EFFECTS OF LIGHTNING ON AIRCRAFT SYSTEMS STRESSED
Yu. Kobzarev and M. Aleksandrov *In its* USSR Rept.: Transportation (JPRS-UTR-84-028) 4 Oct. 1984 p 6-8 Transl. into ENGLISH from Vozdushnyy Transp. (Moscow), 25 Aug. 1984 p 3 (For primary document see N85-12002 03-01)
Avail: NTIS HC A06/MF A01

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N85-12047 Bundesanstalt fuer Flugsicherung, Frankfurt am Main (West Germany).
[ACTIVITIES REPORT IN AIR TRAFFIC CONTROL] Annual Report, 1983 [JAHRESBERICHT, 1983]
Jun. 1984 45 p In GERMAN
Copyright. Avail: Issuing Activity

The organization of civil aviation in the Federal Republic of Germany is described. Developments in air traffic security, navigational aids, radar engineering, information transfer and data processing are discussed. Author (ESA)

N85-12048# Martin Marietta Aerospace, Washington, D.C. Air Traffic Control Div.
SYSTEM ENGINEERING AND INTEGRATION CONTRACT FOR IMPLEMENTATION OF THE NATIONAL AIRSPACE SYSTEM PLAN, VOLUME 1, SECTIONS 1.0-4.0, 6.0 NAS Plan Audit Report
Aug. 1984 209 p
(Contract DTFA01-84-C-00017)
(AD-A145763; ATC-84-0026-Vol-1) Avail: NTIS HC A10/MF A01 CSCL 09/2

When the National Airspace System (NAS) Plan for Facilities, Equipment, and Associated Development was released by the FAA in December 1981, the agency was facing a problem of potentially crisis proportions--that of meeting increasing airspace system demand with dated and deteriorating facilities. At that time, the FAA already had some viable ongoing modernization projects in various stages of planning and development. It was, however, overdue to the extent that airspace system facilities were already being stressed toward capacity, and demanded labor-intensive efforts to sustain aging equipment operation. Consequently, NAS modernization is now faced with over a decade of design, development, replacement, and upgrade activities aggravated by an urgency of completion and an intolerance to error or compromise to safety. The purpose of our audit was to verify the overall goals and objectives of the NAS Plan from the standpoint of technical validity and feasibility, system safety, user benefits, methods, costs, and schedule. In essence, the audit was intended to task and answer the following questions: are the goals and objectives appropriate to satisfy the requirements of both users and operators of the NAS through the year 2000 and beyond; are the planned modernization projects not only technically feasible but valid to satisfy the NAS goals and objectives; will system safety be enhanced through implementation of the modernization projects and uncompromised during the transition to them. GRA

N85-12049# Aeronautical Research Labs., Melbourne (Australia).
OBSERVATIONS OF LIGHTWEIGHT DOPPLER SYSTEM ACCURACY
I. V. Lloyd May 1984 27 p
(AD-A145968; ARL/SYS-TM-70) Avail: NTIS HC A03/MF A01 CSCL 17/7

Data on the accuracy of the Lightweight Doppler Navigation System (LDNS) fitted to a Royal Australia Air Force UH-1H helicopter were gathered as a by-product of an experiment on the TACTERM navigation system. The observed accuracy was found to be close to 1% of distance travelled, a figure generally considered to be representative of modern Doppler navigation systems. The dominant source of LDNS position error was magnetic compass error which in turn appeared to be dominated by spatial and temporal variations in the local magnetical field. GRA

N85-12006# Joint Publications Research Service, Arlington, Va.
NEW AIRPORT GROUND TRAFFIC CONTROL SYSTEM PLANNED
G. Grishayeva *In its* USSR Rept.: Transportation (JPRS-UTR-84-029) 4 Oct. 1984 p 9-11 Transl. into ENGLISH from Vozdushnyy Transp. (Moscow), 5 Jul. 1984 p 3 (For primary document see N85-12002 03-01)
Avail: NTIS HC A06/MF A01

N85-12007# Joint Publications Research Service, Arlington, Va.
START-2 ATC SYSTEM INSTALLATION PROGRESSES AT LENINGRAD
V. Senin *In its* USSR Rept.: Transportation (JPRS-UTR-84-028) 4 Oct. 1984 p 12-13 Transl. into ENGLISH from Pravda (Moscow), 6 Jul. 1984 p 6 (For primary document see N85-12002 03-01)
Avail: NTIS HC A06/MF A01

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N85-12050# Aeronautical Research Labs., Melbourne (Australia).
THE IN-FLIGHT ESTIMATION AND INDICATION OF CUMULA-

TIVE FATIGUE DAMAGE TO HELICOPTER GEARS
K. F. Fraser Mar. 1984 113 p refs
(ARL-AERO-PROP-Report-164; AR-003-013) Avail: NTIS HC A06/MF A01

The safe fatigue life of helicopter transmission components made if in service load data together with transmission fatigue data, represented as the number of cycles of failure as a function of tooth load, were estimated. Instrumentation was developed to provide in flight estimation and indication of the proportion of safe fatigue life expended for critical gears in single or twin engine helicopter transmission systems. Basic transmission load data in the form of totalized times spent in a number of contiguous torque bands are continually updated and stored during flight. The basic load data together with values of life expenditure for critical gears for the current flight are printed out after flight. This technique opens the way towards fatigue life monitoring of individual transmissions. The special demands of the life estimating system and in particular the very significant effects of errors in mean torque estimation are assessed. E.A.K.

N85-12051# National Aerospace Lab., Tokyo (Japan).
AN EXPERIMENTAL STUDY ON THE INDUCED NORMAL FORCE ON TAIL-FINS DUE TO WING-TAIL INTERFERENCE
Masao Shirouzu, Kunio Saga, Yoji Shibato, and Toshio Akimoto May 1984 20 p refs In JAPANESE; ENGLISH summary
(NAL-TR-814; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

The normal force on the tail fins induced by aerodynamic load on front fins was studied. The magnitude of the induced normal force was obtained experimentally from a wind tunnel test of two stage rocket models with both front and tail fin, with either front or tail fin, and without any fin. The variation of the induced normal force with bank angle difference between front and tail fin was also obtained from wind tunnel tests of a roll controllable rocket model. The results are compared with predictions based on the strip theory. This simplified theory gives approximate magnitude and Mach number dependence of the induced normal force, however, it is not sufficient for precise prediction. E.A.K.

N85-12052# Air Force Flight Test Center, Edwards AFB, Calif.
60,000 POUND CAPACITY EXTRACTION SYSTEM Final Report, Nov. 1982 - Jun. 1984
M. R. Wuest and M. A. Lopez Aug. 1984 97 p
(AD-A145841; AD-E001746; AFFTC-TR-84-19) Avail: NTIS HC A05/MF A01 CSCL 15/7

This LAPES (Low Altitude Parachute Extraction System) test program was conducted to determine the suitability of proposed extraction parachute subsystems to safely and reliably extract platform airdrop loads weighing from 31,500 to 60,000 pounds. The following extraction parachutes were evaluated in single and cluster of two configurations: 35-foot diameter single slot (ss), 44-foot diameter ribbon (R), 40-feet diameter R, and 35-foot diameter R. Twenty-seven tests were conducted during this test program. A modified HC-130H aircraft was used as the drop aircraft except for the first test where a C-141 was used. The aircraft flew at 130 knots indicated airspeed and at pressure altitudes of 2,280 to 5,000 feet. The load weights ranged from 12,880 to 42,000 pounds. Test results indicated that a cluster of two 35 foot diameter R extraction parachutes and a 15 foot diameter drogue parachute was the most suitable combination to extract a load of 60,000 pounds. GRA

N85-12053# Systems Control Technology, Inc., Palo Alto, Calif.
NONLINEAR SYSTEM IDENTIFICATION METHODOLOGY DEVELOPMENT BASED ON F-4S FLIGHT TEST DATA ANALYSIS Final Report
J. H. Vincent, S. N. Franklin, U. H. Rabin, and T. L. Trankle Dec. 1983 179 p
(Contracts N00421-81-C-0289; N00014-78-C-0641)
(AD-A146289) Avail: NTIS HC A09/MF A01 CSCL 14/2

The Naval Air Test Center (NATC) and Systems Control Technology, Inc. (SCT) have worked jointly to develop an advanced flight test data processing technique that supports an integrated flight testing procedure (i.e., extraction of test data for multiple test requirements from common flight conditions). This data processing technique is commonly referred to as system (or parameter) identification. Realization of this goal for an integrated flight testing procedure is dependent on the ability to identify nonlinear aerodynamic characteristics and propulsion system performance from flight test data. The identified models can be used to define performance, stability and control, and unaugmented airframe dynamic characteristics of the aircraft being evaluated. The need for improved modeling of aircraft aerodynamic characteristic has been, and continues to be apparent in numerous areas of technical and operational importance. Four such areas are: (1) flying quality military specification compliance testing, (2) training simulations, (3) design methods for specification of aircraft characteristics, and (4) the development of mission profiles that make optimum use of the airplane's capabilities. In general, there is a need for an improved understanding of an airplane's aerodynamic characteristics to support design improvements for increased cost effectiveness, expanded mission flexibility and enhanced operational safety. GRA

N85-12054# Illinois Univ., Urbana. Urbana Dept. of Aeronautical and Astronautical Engineering.
STOCHASTIC MOTOR BLADE DYNAMICS Final Report, Dec. 1977 - Jun. 1984
Y. K. Lin and J. E. Prussing Jul. 1984 11 p
(Contract DAAG29-81-K-0072; Grant DAAG29-78-G-0039)
(AD-A146312; AAE-84-3; UILU-ENG-84-0503; ARO-15193.9-EG; ARO-17830-5-EG) Avail: NTIS HC A02/MF A01 CSCL 01/3

The results of a theoretical investigation into the effects of atmospheric turbulence on the dynamical behavior of helicopter rotor blades are reported. Turbulence is found to destabilize the uncoupled flapping and coupled flapping-torsional motions; however, it stabilizes the coupled flapping-lagging motion by effectively increasing the damping in the least stable lead-lag mode. When a motion is stable, turbulence contributes to random fluctuation from the average system response. Under a trim condition, which suppresses the first harmonics in flapping, the effect of turbulence, as measured by the standard deviation of system response, is of the same order of magnitude as the second harmonics in the deterministic (i.e., an idealized turbulence-free) solution. Author (GRA)

N85-12055# Aeronautical Research Labs., Melbourne (Australia).
ESTIMATION OF HELICOPTER PERFORMANCE USING A PROGRAM BASED ON BLADE ELEMENT ANALYSIS
A. M. Arney Jul. 1984 88 p
(AD-A146341; ARL/AERO-TM-365) Avail: NTIS HC A05/MF A01 CSCL 01/2

A convenient method of predicting helicopter performance is presented, which is applicable up to speeds corresponding to an advance ratio of 0.3, for any conventional helicopter (i.e., single main rotor) with flapping blades. This method uses a computer program, POLAR, which is based on a blade-element analysis assuming uniform induced flow. Program POLAR can be employed for most steady flight conditions and is not subject to limitations imposed by the use of performance tables and charts. Details of blade operating conditions may be estimated at specified points on the rotor disc. The structure of the program and examples of its use are given. Comparisons of estimates obtained using POLAR, with other performance methods are also included. Author (GRA)

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N85-12056# Systems Associates, Long Beach, Calif. Resource Management Systems Div.

COMMAND FLIGHT PATH DISPLAY. PHASE I AND II: APPENDIX F Final Technical Report
Sep. 1983 271 p
(Contract F33615-79-C-3618)
(AD-A145858; SAI-83-01; SAI-S-82-03) Avail: NTIS HC A12/MF A01 CSCL 01/4

Contained in this appendix are the various plots generated during data reduction. Parameters plotted include Altitude (flight plan and actual vs. distance*), Lateral Deviation (horizontal distance from flight plan path vs. distance), and Velocity (flight plan, actual, and CFPD velocity indicator vs. distance). Flight test cases involving the modified Charlie pattern were segmented into Routes, each plot containing two consecutive Routes. A chart is included indicating the relative location of these Routes. GRA

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N85-12057 Cincinnati Univ., Ohio.
PERFORMANCE DETERIORATION OF CASCADES EXPOSED TO SOLID PARTICLES Ph.D. Thesis
Chellappa Balan 1984 169 p
Avail: Univ. Microfilms Order No. DA8413691

The performace degradation in turbomachinery exposed to solid particle ingestion was studied. The erosive nature of the solid particles ingested leads to changes in the rotor/stator blade profiles and their surface roughness. These changes in the blade shapes and roughness alters the blade surface boundary layer development and the performance of the turbomachines. An experimental investigation was concluded on two dimensional NACA 65(10) 10 compressor airfoil cascades. Thsese cascades were made of 6061-T6 aluminum alloy and were exposed to 165 microns quartz sand in a specially built cascade erosion tunnel. Two types of cascades were investigated, namely accelerating and diffusing. The erosion of the blades, and the performance of the erodes cascades were studied. The theoretical analysis of the performance deterioration consists of predicting the blade erosion and the loss mechanisms in the cascades. The computation of the particle trajectories using compressible inviscid flow field through the cascade, yields the particle impact locations along the blade surfaces. Then the experimental correlations for surface quality and erosion based on the flat plate data are applied at every impact location. Dissert. Abstr.

N85-12058 Cornell Univ., Ithaca, N.Y.
UNSTEADY AERODYNAMIC RESPONSE OF CASCADES AND TURBOROTORS Ph.D. Thesis
Vinod Govind Mengle 1984 255 p
Avail: Univ. Microfilms Order No. DA8415387

The unsteady aerodynamic forces due to arbitrary transient motions of the blades in an axial turborotor are studied by using linearized cascade theory. The mathematical techniques in single airfoil theory are extended to cascaded airfoils. Approximate expressions are obtained for the indicial and the oscillatory forces essential to applications in aeroelastic problems. Pade Approximants based on the Maclaurin series of the transformed responses are constructed next for various solidities. These describe the transient responses as the sums of terms exponentially decaying with time. The time-constants for such transient processes are shown to depend on the zeros of a certain hypergeometric function. In staggered cascades, the inverse Fourier transforms of the standard harmonic coefficients, unlike the case in isolated airfoil, prove to be complex. They correspond to the response of indicial motions in which the amplitudes on adjacent blades differ by a complex factor. These responses, termed here as the Generalized Cascade indicial Function, are calculated for various cascade parameters using rational approximants with complex coefficients for the standard harmonic coefficients. Dissert. Abstr.

N85-12059*# General Electric Co., Cincinnati, Ohio. Aircraft Engine Engineering Div.
MATERIALS FOR ADVANCED TURBINE ENGINES. PROJECT 2: RENE 150 DIRECTIONALLY SOLIDIFIED SUPERALLOY TURBINE BLADES, VOLUME 2 Final Report
G. J. DeBoer Feb. 1982 39 p 2 Vol.
(Contract NAS3-20074)
(NASA-CR-167993; NAS 1.26:167993; R82AEB540-Vol-2) Avail: NTIS HC A03/MF A01 CSCL 21E

The results of the engine testing of Rene 150 Stage 1 high pressure turbine blades in CF6-50 core and fan engines are presented. The core engine test was conducted for 233 hours with a variety of test cycles, and the fan engine test was conducted for 1000 C cycles. Post-test analysis of the core engine test data confirmed the suitability of the Rene 150 HPT blade for fan engine testing. Post-test evaluation and analysis of the fan engine test blades included visual and dimensional inspection as well as metallographic examination of selected blades. The Rene 150 HPT blade met the target goal of this project by demonstrating increased metal temperature capability; however, the post-test analysis revealed several areas that would have to be addressed in designing a long-life Rene 150 CF6-50 HPT blade. R.S.F.

N85-12060# Douglas Aircraft Co., Inc., Long Beach, Calif.
A COMPARATIVE EVALUATION OF EMADS (ENGINE MONITORING AND DISPLAY SYSTEM) AND CONVENTIONAL ENGINE INSTRUMENTS
D. A. Po-Chedley Sep. 1981 98 p
(AD-A145901; MDC-J2330) Avail: NTIS HC A05/MF A01 CSCL 21/5

A study was conducted to assess the performance benefits associated with the use of the General Electric Engine Monitoring and Display System (EMADS). An experiment was designed to compare pilot performance using both EMADS and conventional engine instruments. Data was collected from eight DC-10 qualified pilots having an average of over 13,000 hours of flight experience. The flight task for each of the sixteen test trials consisted of engine startup, manual takeoff, and climbout to 5,000 feet in a fixed base simulator. In addition, a number of predefined engine related fault conditions were introduced at various points during the simulation, with the pilots being instructed to execute the appropriate corrective action. For each of the fault monitoring tasks, performance (reaction time) with EMADS was as good or better than that resulting from the use of conventional instruments. Subjective input obtained from the pilots indicated a clear preference for EMADS. Recommendations are made regarding future research activity. GRA

N85-12061# United Technologies Research Center, East Hartford, Conn.
BASIC STUDY OF BLADED DISK STRUCTURAL RESPONSE Final Report, Sep. 1979 - Jan. 1984
A. V. Srinivasan and D. G. Cutts Nov. 1983 250 p
(Contract F33615-79-C-2054)
(AD-A146226; R83-914806-48; AFWAL-TR-83-2075) Avail: NTIS HC A11/MF A01 CSCL 01/3

Vibration induced fatigue failure of rotor blades is of continuing concern to the designer of aircraft engines. The emphasis on improved engine performance under the necessary constraints of minimum weight and satisfactory life requires that vibration levels in all rotor blades be kept low. Further, certain important design considerations of rotor blades require a thorough understanding of the aeromechanical characteristics of bladed disk assemblies. These design considerations include: (1) blade life prediction which uses vibration amplitudes in its calculations, (2) setting allowable

frequency margins which need to be justified on the basis of the intensity of resonant stresses at integral order speeds, and (3) prediction of susceptibility of the component to aeroelastic instabilities. The dynamic response of a shrouded fan was characterized over a range of speeds by subjecting the assembly to forced vibration in vacuum in a spin rig and to distortion induced vibration in an aerodynamic rig. The characterization was established by analysis of blade strain response data obtained when the assembly was driven by predetermined standing or traveling wave forcing through piezoelectric crystal drive elements attached to the blades, by means of an aerodynamic distortion screen and by exit guide vanes. Both tuned and mistuned configurations of the assembly were tested. In addition, the relative motion at shroud interfaces was measured using optical sensors for various input conditions. The vibratory motions were of a microslip type with no evidence of stick-slip type of motion. GRA

N85-12062# Rolls-Royce Ltd., Derby (England).
PROPULSION
J. A. Borradaile 1 Aug. 1984 42 p
(PNR-90208) Avail: NTIS HC A03/MF A01

The history of the jet engine for civil aircraft from the Whittle jet of the 1940's to high bypass ratio turbofans is described. Engine functioning, and environmental influences on engine design, including fuel prices, noise, and the pressures for longer engine lives on wing are discussed. Author (ESA)

N85-12063# Rolls-Royce Ltd., Derby (England).
CYCLIC ENDURANCE TESTING OF THE RB211-22B CAST HP TURBINE BLADE
J. S. Ponsford and G. K. Waddington 1 May 1984 13 p
(PNR-90210) Avail: NTIS HC A02/MF A01

A cyclic endurance program to prove the design of a cast, directionally solidified high pressure turbine blade was developed to simulate the total in-flight service life of the blade. Definition of the endurance cycles, automation used in running the cyclic tests, and modifications incorporated to ensure that testing was kept representative of the service environment are discussed. Results demonstrate that the design objective (10,000 hr) can be achieved in airline service. Author (ESA)

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N85-12064 Virginia Polytechnic Inst. and State Univ., Blacksburg.
NUMERICAL SIMULATION OF THE SUBSONIC WING-ROCK PHENOMENON Ph.D. Thesis
Panagiotis A. Konstadinopoulos 1984 142 p
Avail: Univ. Microfilms Order No. DA8417825

A method to calculate unsteady, incompressible, inviscid, three-dimensional flows around arbitrary planforms, is coupled with the equation of motion for a slender wing rolling about an axis parallel to its midspan. This one degree of freedom motion can simulate the wing-rock phenomenon. The basic mechanism, the cause and the parameters affecting this nonlinear motion was studied. The model is a flat plate delta wing with 80 degrees leading edge sweep and leading edge separation is considered. A mathematical simulation of wing rock suggests that roll damping, which is positive at low angles of attack, changes sign as the angle of attack increases. The rolling moment coefficient is separated into restoring and damping terms, and the contribution of each was studied. It is found that during wing rock the linear term of the restoring part grows at large roll angles which limits the motion to an oscillation of finite amplitude and at small roll angles the linear term of the damping part dominates and drives the wing away from the equilibrium position. Dissert. Abstr.

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N85-12065 National Maritime Inst., Feltham (England).
AN APPRAISAL OF AN OUT-OF-PHASE FEED-BACK SYSTEM FOR THE VARIATION OF DAMPING OF DYNAMIC WIND-TUNNEL MODELS
A. M. Elliott and D. E. Walshe Mar. 1984 29 p refs Sponsored by United Kingdom Dept. of Industry Maritime Technology Committee and Mechanical and Electrical Requirements Board
(NMI-189; NMI-P/354011; MTC/MEERB-Folio-2) Copyright. Avail: Issuing Activity

Application of a damping force to an oscillating wind tunnel model structure where the damping force is generated by an out-of-phase feed-back system from the model acceleration is described. It is found that the system is suitable for light aeroelastic models where eddy current damping is impracticable.
Author (ESA)

N85-12066# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Geotechnical Lab.
DESIGN OF ALTERNATE LAUNCH AND RECOVERY SURFACES FOR ENVIRONMENTAL EFFECTS Final Report, Jan. 1982 - Oct. 1983
A. J. Bush, III, R. C. Gunkel, Sr., G. L. Regan, and R. L. Berg Tyndall AFB, Fla. AF Engineering and Service Center. Jul. 1984 206 p
(AF Proj. 2621)
(AD-A145800; AFESC/ESL-TR-83-64) Avail: NTIS HC A10/MF A01 CSCL 01/5

This report documents a research effort to develop pavement design requirements for Alternate Launch and Recovery Surfaces (ALRS) that will minimize the cost and reduce deterioration due to environmental (i.e., climate and aging) factors. A minimum asphalt surface thickness of 2 inches was established through traffic testing of three test items. Seven environmentally aged pavements in nontraffic areas (shoulders, overruns, etc.) were trafficked to failure. Results from these tests indicated that the base course strength was below the design strength and therefore pavements failed before design estimates. GRA

N85-12067# Army Construction Engineering Research Lab., Champaign, Ill.
DEVELOPMENT OF A PAVEMENT MAINTENANCE MANAGEMENT SYSTEM. VOLUME 10: SUMMARY OF DEVELOPMENT FROM 1974 THROUGH 1983 Final Report
M. Y. Shahin and T. D. James Tyndall AFB, Fla. AFESC Jul. 1984 36 p
(AD-A146035; CERL-TR-C-76; AFESC/ESL-TR-83-55-Vol-10)
Avail: NTIS HC A03/MF A01 CSCL 01/5

This report documents and summarizes the development of the pavement maintenance management system from 1974 through 1983. The most important aspects of the development are discussed, step by step. These are: development of the Pavement Condition Index, development of maintenance and repair (M&R) guidelines, validation of the M&R guidelines, development of initial prediction models, development of consequence system programs, development of final prediction models, and adoption of the PAVER pavement management system. GRA

N85-12068# Drexel Univ., Philadelphia, Pa. Dept. of Civil Engineering.
MATERIALS FOR EMERGENCY REPAIR OF RUNWAYS Interim Report, 1 Oct. 1983 - 31 Mar. 1984
S. Popovics 30 Apr. 1984 148 p
(Grant AF-AFOSR-0245-83)

(AD-A146139; Rept-001129-1; AFOSR-84-0693TR) Avail: NTIS HC A07/MF A01 CSCL 11/2

The purpose of the investigation here was to test four inorganic cementing materials, and screen out from further investigation those that are obviously unsuitable for the fulfillment of the requirements for emergency repair of concrete runways under war conditions. The four materials are SET-45 cold formula; SET-45 hot formula; Aluminum phosphate (AlP cement; and Jet cement. In addition, a 50/50 blend of the SET-45 cold and hot formulas was investigated, and a portland cement of Type III was tested for the sake of comparison. The SET-45 formulas and the AlP cement are based on magnesium oxide. The Jet cement is a modified portland cement. A combination of mechanical testing and physicochemical examinations was used. The mechanical testing concentrated on the early strength developing capabilities of the cements under room temperature. GRA

N85-12069# Army Construction Engineering Research Lab., Champaign, Ill.

DEVELOPMENT OF A PAVEMENT MAINTENANCE MANAGEMENT SYSTEM. VOLUME 9: DEVELOPMENT OF AIRFIELD PAVEMENT PERFORMANCE PREDICTION MODELS Final Report, Jan. 1980 - Sep. 1983

M. Y. Shahin, G. R. Nelson, J. M. Becker, and S. D. Kohn Tyndall AFB, Fla. Air Force Engineering and Sciences Center May 1984 203 p

(AF Proj. 2054)

(AD-A146150; CERL-TR-C-76-Vol-9; AFESC/ESL-TR-83-45) Avail: NTIS HC A10/MF A01 CSCL 01/5

Extensive data were collected from 327 airfield pavement features at 12 U.S. Air Force bases. The data, which provided a wide range of information on designs, materials, traffic, and climate, were used to develop PCI and key distress prediction models for both asphalt-concrete and jointed-concrete-surfaced pavements. Four satisfactory models were developed for predicting PCI for PCC and AC/PCC pavements, corner breaks in PCC pavements, and reflection cracking in AC/PCC pavements. Additional data were collected from 101 airfield pavement features at five of the Air Force bases originally surveyed to evaluate the four prediction models. The evaluation showed that the PCI prediction models are satisfactory. The reflection cracking model also provided reasonable prediction of eight pavement features. However, verification of the corner break model showed that it has a high standard deviation of prediction. Evaluation of the models for each of the five bases showed that predictions for some of the bases were much better than others, possibly because some of the material properties, climatic factors, and traffic conditions in certain bases were not well represented in the overall model. Thus, it was concluded that localized modeling could provide much more accurate predictions. GRA

N85-12070# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).

MINIMIZATION OF WALL INTERFERENCE FOR THREE-DIMENSIONAL MODELS WITH TWO-DIMENSIONAL WALL ADAPTATION

L. Lamarche and E. Wedemeyer Mar. 1984 56 p refs

(VKI-TN-149) Avail: NTIS HC A04/MF A01

A method to calculate two dimensional wall adaptation to minimize wall interferences for three dimensional flows is proposed for wind tunnel design. Theoretical formulations for displacement and lift effects are presented. An experimental verification for the displacement effect is included. Author (ESA)

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N85-12071*# Battelle Columbus Labs., Ohio.

PRELIMINARY ANALYSIS OF SPACE MISSION APPLICATIONS FOR ELECTROMAGNETIC LAUNCHERS Final Technical Report

Lisa A. Miller, Eric E. Rice, Richard W. Earhart, and Robert J. Conlon 30 Aug. 1984 326 p refs

(Contract NAS3-23354)

(NASA-CR-174067; NAS 1.26:174067) Avail: NTIS HC A15/MF A01 CSCL 22A

The technical and economic feasibility of using electromagnetically launched EML payloads propelled from the Earth's surface to LEO, GEO, lunar orbit, or to interplanetary space was assessed. Analyses of the designs of rail accelerators and coaxial magnetic accelerators show that each is capable of launching to space payloads of 800 KG or more. A hybrid launcher in which EML is used for the first 2 KM/sec followed by chemical rocket stages was also tested. A cost estimates study shows that one to two EML launches per day are needed to break even, compared to a four-stage rocket. Development models are discussed for: (1) Earth orbital missions; (2) lunar base supply mission; (3) solar system escape mission; (4) Earth escape missions; (5) suborbital missions; (6) electromagnetic boost missions; and (7) space-based missions. Safety factors, environmental impacts, and EML systems analysis are discussed. Alternate systems examined include electrothermal thrustors, an EML rocket gun; an EML theta gun, and Soviet electromagnetic accelerators. A.R.H.

N85-12072# Royal Norwegian Council for Scientific and Industrial Research, Blindern. Space Activity Div.

SPACE RESEARCH IN NORWAY Annual Report, 1983

Arne Gundersen and Ann-Lisbeth Ruud Holtet 1984 55 p refs Presented at COSPAR Meeting, Graz, 2-7 Jul. 1984

(SAD-110-T; ISBN-82-7224-066-1) Avail: NTIS HC A04/MF A01

Norwegian space physics, astrophysics and space-related life science research is summarized. A rocket range, telemetry station, EISCAT facility, ionospheric heating facility, the Partial Reflections Experiment D-region radio wave study, and the Scandinavian Twin Auroral Radar Experiment are described. Participation in ESA programs is indicated. Author (ESA)

N85-12073# Swedish Board for Space Activities, Stockholm.

SPACE RESEARCH IN SWEDEN Annual Report, 1982-19[illegible]

K. Fredga, ed. 1984 59 p refs Presented at COSPAR Meeting, Graz, 2-7 Jul. 1984

Avail: NTIS HC A04/MF A01

Swedish research in magnetospheric and ionospheric physics; upper atmosphere; astrophysics; material sciences; and remote sensing is summarized. Measurements of charged particles and electric and magnetic fields using satellites, sounding rockets, and balloons; study of atmospheric processes and composition at high latitudes using sounding rockets; studies of solar and stellar UV radiation, and IR studies using satellite sounding rockets and balloons; solidification processes of metals in zero-g and diffusion processes in liquid metals using sounding rockets; and microwave radiometry, spectral signatures and image analysis using satellite images and airborne or landbased sensors are described. Author (ESA)

N85-11999# Joint Publications Research Service, Arlington, Va.

FOKKER WANTS TO START NEW NETHERLANDS SPACE PROGRAM

Sjoerd vanderWerf *In its* West Europe Rept.: Sci. and Technol. (JPRS-WST-84-004) 24 Jan. 1984 p 1-4 Transl. into ENGLISH from NRC Handelsblad (Rotterdam), 7 Dec. 1983 p 11 (For primary document see N85-11998 03-01)

Avail: NTIS HC A05/MF A01

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N85-12074 Texas Univ., Austin.

AUTONOMOUS NAVIGATION OF USAF SPACECRAFT

Ph.D. Thesis
Jackson Robert Ferguson, Jr. 1983 218 p
Avail: Univ. Microfilms Order No. DA8414366

Observations from several medium-accuracy space sensors, such as the existing telescopic space sextant are compared with those of future matrix-type sensors. The large field of view of matrix sensors should permit determining the Earth horizon to approximately an order of magnitude better than current infrared sensors by observing atmospheric refraction of stellar light. This horizon determination will give the matrix sensors an accuracy of less than 1 km. The limiting factor in Earth-horizon determination is the modeling of atmospheric refraction effects. For high-accuracy requirements (100 meters or less), the Global Positioning System (GPS) offers the only near-term solution. A relative navigation technique using range and Doppler data is proposed for autonomous navigation of the GPS satellites. The navigation accuracy of this technique is evaluated by considering covariance analysis and by processing corrupted data through a reduced-order onboard sequentially partitioned algorithm. The algorithm is stable and for the GPS system produces in-plane accuracy of 40 meters over twenty days. However, out-of-plane motion is shown to be unobservable in the GPS-to-GPS tracking mode, and errors of up to 1.5 km over 60 days are experienced. For this reason, a supplemental transmitter on the ground or in a different orbit is recommended. Dissert. Abstr.

N85-12431# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
TRACKING REQUIREMENTS FOR PRECISE ERS-1 ORBIT DETERMINATION
K. F. Wakker and B. A. C. Ambrosius *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 73-78 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air).*

N85-12000# Joint Publications Research Service, Arlington, Va.
SWEDEN'S KIRUNA MAY BE FUTURE LAUNCH SITE FOR SATELLITES
Caj Noren *In its* West Europe Rept.: Sci. and Technol. (JPRS-WST-84-004) 24 Jan. 1984 p 5-6 Transl. into ENGLISH from Dagens Nyheter (Stockholm), 2 Dec. 1983 p 26 (For primary document see N85-11998 03-01)
Avail: NTIS HC A05/MF A01

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N85-12075*# General Research Corp., McLean, Va.
PROCEEDINGS OF A WORKSHOP ON APPLICATIONS OF TETHERS IN SPACE, EXECUTIVE SUMMARY Final Report
1 Dec. 1983 70 p Proc. held in Williamsburg, Va., 15-17 Jun. 1983 3 Vol.
(Contract NAS8-35403)
(NASA-CR-171195; NAS 1.26:171195) Avail: NTIS HC A04/MF A01 CSCL 22B

The objectives were to identify potential applications for tethers in space; develop a first order assessment of the feasibility and benefits of tether applications; recommend future actions necessary to enable tether applications, including required technology advancements; and stimulate industry and government planners to consider the unique properties of tethers in designs for future missions. B.G.

N85-12076*# General Research Corp., McLean, Va.
PROCEEDINGS OF A WORKSHOP ON THE APPLICATIONS OF TETHERS IN SPACE, VOLUME 1 Final Report
1 Dec. 1983 294 p Proc. held in Williamsburg, Va., 15-17 Jun. 1983 3 Vol.
(Contract NAS8-35403)
(NASA-CR-171196; NAS 1.26:171196) Avail: NTIS HC A13/MF A01 CSCL 22B

Project overview; tether deployment; satellite system description; tether fundamentals; science applications; electrodynamic interactions; transportation; artificial gravity; and constellations; were described. B.G.

N85-12077*# General Research Corp., McLean, Va.
PROCEEDINGS OF A WORKSHOP ON APPLICATIONS OF TETHERS IN SPACE, VOLUME 2 Final Report
1 Dec. 1983 315 p refs Proc. held in Williamsburg, Va., 15-17 Jun. 1983 3 Vol.
(Contract NAS8-35403)
(NASA-CR-171197; NAS 1.26:171197) Avail: NTIS HC A14/MF A01 CSCL 22B

The panel conclusions for each of the following panels (science applications; electrodynamic interactions; transportation applications; artificial gravity; constellations; and technology and test) are given. B.G.

N85-12078# Royal Netherlands Aircraft Factories Fokker, Schiphol-Oost. Space Div.
IN-ORBIT EXPERIMENTS ON IRAS FOR APPLICATION TO THE ISO SATELLITE Final Report
L. Karsten and E. Bongers Paris ESA May 1984 118 p refs (Contract ESTEC-5623/83/NL-AN(SC))
(FOK-TR-R-84-057; ESA-CR(P)-1917) Avail: NTIS HC A06/MF A01

In-orbit experiments on Infrared Astronomy Satellite (IRAS) studied the origin of thermal misalignment responsible for cross-scan attitude error developments up to 100 arcsec, and the effect of helium sloshing on IRAS attitude control performance. Misalignment is attributed to the Fine Sun Sensor brackets and satellite structure. The initial thermal misalignment model with two constants was loaded in the IRAS onboard computer. The in-flight performance of the model demonstrates the feasibility of onboard compensation. No evidence of slosh effects is found, even after a frequency analysis of flight data resulting from special slosh-evoking maneuvers. Author (ESA)

N85-12001# Joint Publications Research Service, Arlington, Va.
VIEW OF ARIANE COUNTDOWN PROCEDURES, KOUROU LAUNCH FACILITIES
Alain Perez *In its* West Europe Rept.: Sci. and Technol. (JPRS-WST-84-004) 24 Jan. 1984 p 7-16 Transl. into ENGLISH from Ind. and Tech. (Paris), 10 Sep. 1983 p 74-83 (For primary document see N85-11998 03-01)
Avail: NTIS HC A05/MF A01

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

N85-12079*# Computer Sciences Corp., Huntsville, Ala.
STS NATURAL ENVIRONMENT ANALYSIS Final Report, 1 Aug. - 30 Sep. 1984
Wade Batts 7 Nov. 1984 76 p

(Contract NAS8-35988)
(NASA-CR-171221; NAS 1.26:171221) Avail: NTIS HC A05/MF A01 CSCL 22B

Climatological data sets to determine the risk of Shuttle landing delay for selected alternate landing sites were evaluated. Construction of a Shuttle ascent data tape using L-O atmospheric data for a specified Shuttle launch are reported. E.A.K.

N85-12080# Institute for Defense Analyses, Alexandria, Va.
CONTINUING ISSUES (FY 1983) CONCERNING MILITARY USE OF THE SPACE TRANSPORTATION SYSTEM Final Report, Oct. 1982 - Nov. 1983
R. G. Finke, C. J. Donlan, and G. W. Brady Dec. 1983 114 p
(Contract MDA903-79-C-0018)
(AD-A146091; AD-E500681; IDA-P-1762; IDA/HQ-83-28220) Avail: NTIS HC A06/MF A01 CSCL 22/2

This study is a continuation of IDA studies of DoD concerns about the Space Transportation System (STS). Principal issues were the payload and cost of upper stages for delivery to geostationary orbit (GEO) from the Shuttle, and the possible trends to cost and operational efficiency of the Shuttle itself. Regarding the GEO payload capabilities of different upper stages on the Shuttle, the study addressed the capability from VAFB to GEO of the Centaur, the size and costs of conventional hybrid integral-propulsion solid perigee stages to utilize efficiently an integral submultiple of the Shuttle cargo bay, the compatibility of apogee-insertion and evasive-maneuvering requirements in defining the thrust of the engine for the integral propulsion system, the performance improvements in allowing the integral propulsion system to grow to fill the orbiter's total capacity on a fixed-size solid perigee stage, and the performance into 65-deg or 8-deg-inclination 24-hr circular orbits in comparison with that in GEO. GRA

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

N85-12081# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).
TELEMETRY (TM)/TELECOMMAND (TC) PROCESSOR STUDY Final Report
Buescher Paris ESA Mar. 1984 44 p
(Contract ESTEC-5563/83/NL-BS)
(ESA-CR(P)-1915) Avail: NTIS HC A03/MF A01

Functions to be performed to receive telemetry from and send telemetry to a satellite system during assembly, integration and testing activities at system level, using ESA-type checkout equipment architecture, were identified. A telemetry/telecommand processor (TTP) model was defined. The TTP should consist of at least two physically separated building blocks: a transport subsystem (TTPT), and a management subsystem (TTPM). The TTPM acts as a gateway to the TM/TC data transfer system. A star-type communication system between electrical ground support equipment is recommended. The MTP comprises the centralized facilities for the control of the master test sequence and of the overall test configuration. The TTPM comprises the centralized facilities for TM data distribution, and TC data acquisition and time distribution. Author (ESA)

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics.*

N85-12082# Communications Research Centre, Ottawa (Ontario). Space Technology and Applications Branch.
DAMPING SYNTHESIS FOR A SPACECRAFT USING SUBSTRUCTURE AND COMPONENT DATA
K. W. Lips and F. R. Vigeron Aug. 1984 88 p refs
(CRC-1365) Avail: NTIS HC A05/MF A01

A method for the synthesis of modal damping factors and other modal data for a spacecraft in orbit is demonstrated. It is based on input information at the component/substructure level. Also, the use of the method and the level of accuracy obtained is illustrated in a case study of the Hermes spacecraft. The synthesis procedure is demonstrated for a spacecraft configuration consisting of a central rigid body, solar array substructures, a momentum wheel and a liquid mercury damping device. The synthesized spacecraft modal data is obtained by eigenproblem analysis of a system model that is constructed from submodels of the components. The system modes are the natural (unconstrained) modes with damping and gyroscopic stiffness accounted for. Numerical experiments show that the procedure is not sensitive to errors in or to omission of damping factors of the higher order substructure modes. Damping factors for the nutational mode are confirmed by an independent analysis. Author

N85-12083# Office of Technology Assessment, Washington, D.C.
CIVILIAN SPACE STATIONS AND THE US FUTURE IN SPACE: SUMMARY
Nov. 1984 36 p
(OTA-STI-242) Avail: NTIS HC A03/MF A01

An assessment of civilian space stations and future U.S. involvement in space is provided. A rationale for space infrastructure is advanced and infrastructure options are presented. Space infrastructure platforms that could be serived by the shuttle or by orbital maneuvering vehicles are listed. Procurement options for space infrastructure are given. The role of international space programs, NASA, and the U.S. private sector in space activity is discussed. R.S.F.

N85-12084*# Boeing Aerospace Co., Seattle, Wash.
DEFINITION OF TECHNOLOGY DEVELOPMENT MISSIONS FOR EARLY SPACE STATIONS: LARGE SPACE STRUCTURES Final Report
31 May 1983 108 p refs
(Contract NAS8-35043)
(NASA-CR-171209; NAS 1.26:171209; D180-27677-1) Avail: NTIS HC A06/MF A01 CSCL 22B

The testbed role of an early (1990-95) manned space station in large space structures technology development is defined and conceptual designs for large space structures development missions to be conducted at the space station are developed. Emphasis is placed on defining requirements and benefits of development testing on a space station in concert with ground and shuttle tests. M.G.

N85-12085*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
VERIFICATION TESTS OF DURABLE TPS CONCEPTS
J. L. Shideler, G. L. Webb, and C. M. Pittman Sep. 1984 12 p refs Presented at the 19th AIAA Thermophys. Conf., Snowmass, Colo., 25-28 Previously announced as A84-37493
(NASA-TM-86313; NAS 1.15:86313) Avail: NTIS HC A02/MF A01 CSCL 22B

Titanium multiwall, superalloy honeycomb, and Advanced

Carbon-carbon (ACC) multipost Thermal Protection System (TPS) concepts are being developed to provide durable protection for surfaces of future space transportation systems. Verification tests including thermal, vibration, acoustic, water absorption, lightning strike, and aerothermal tests are described. Preliminary results indicate that the three TPS concepts are viable up to a surface temperature in excess of 2300 F. Author (IAA)

N85-12086# Air Force Geophysics Lab., Hanscom AFB, Mass.
CHARGING OF THE DMSP F-2 SPACECRAFT IN THE AURORA ON 10 JANUARY 1983
A. L. Besse, A. G. Rubin, and D. A. Hardy 26 Sep. 1984 8 p Presented at the Spacecraft Environ. Interactions Technol. Conf., 4-6 Oct. 1983, Colorado Springs
(AF Proj. 7661)
(AD-A146303; AFGL-TR-84-0243) Avail: NTIS HC A02/MF A01 CSCL 20/3

Two independent instruments on the spacecraft showed charging to a moderate (65 volts) negative potential. The electron spectrometer showed a flux of 2 x ten to the 9th power electrons cm/sec/ster peaked at 9.5 keV. This was marginally sufficient to overcome the flux of cold ambient ions. Charging calculations are presented showing where simplifications are justified and where serious uncertainties exist. More serious charging is predicted for the Shuttle in polar orbit. GRA

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

N85-12421# European Space Agency, Paris (France).
THE ERS-1 RADAR ALTIMETER: AN OVERVIEW
C. R. Francis *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 9-16 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

N85-12422# Selenia S.p.A., Rome (Italy).
THE ERS-1 RADAR ALTIMETER INSTRUMENT
G. Levrini, F. S. Rubertone, and W. Ruehe (Dornier-Werke G.m.b.H., Friedrichshafen, West Germany) *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 17-22 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

N85-12445# Stuttgart Univ. (West Germany). Inst. for Navigation.
THE PRECISE RANGE AND RANGE RATE EQUIPMENT (PRARE) AND ITS POSSIBLE SUPPORT TO THE RADAR ALTIMETER MEASUREMENT FOR ERS-1
P. Hartl *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 153-160 ref (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

N85-12453# European Space Agency, Paris (France).
THE ALTIMETER AS A SUPPORT TO THE SCATTEROMETER IN THE REPRESENTATION OF WINDS AND DERIVED WAVE FIELDS IN COASTAL WATERS AND ENCLOSED SEAS: A RESEARCH AT ITS ONSET
R. Frassetto (EARSeL Working Group 2), T. Guymer (EARSeL Working Group 2), S. Zecchetto (EARSeL Working Group 2), C. Brossier (EARSeL Working Group 2), L. Ciraolo (EARSeL Working Group 2), and C. G. Rapley (EARSeL Working Group 2) *In its* ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 193-197 (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

N85-12454# Centre National d'Etudes Spatiales, Toulouse (France).
THE POSEIDON ALTIMETER DESCRIPTION
P. Raizonville *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 199-204 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

N85-12456# Centre National d'Etudes Spatiales, Toulouse (France). Groupe de Recherche de Geodesie Spatiale.
CALIBRATION AND VALIDATION AREAS
Y. Menard *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 209-213 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N85-12087# National Aerospace Lab., Tokyo (Japan).
EXPERIMENTS ON RESIDUAL THRUST AND PREDICTION FOR UPPER-STAGE SOLID PROPELLANT ROCKETS
Tohru Mitani, Mamoru Takahashi, Takashi Niioka, Kazuo Kusaka, Tatsuo Kumagai, Makoto Tadano, Takayuki Sudo, Hiroshi Miyajima, Norio Saito, and Shinji Nio Mar. 1984 26 p In JAPANESE; ENGLISH summary
(NAL-TR-800; ISSN-0389-4010) Avail: NTIS HC A03/MF A01

Subscale rocket motors of 150 mm (cylindrical) in dia. and 380 mm (spherical) in dia. were tested to investigate the small residual thrust of solid propellant rockets. The residual chamber pressure was measured by using pressure gages with full ranges of 2.5 and 5 psia (0.334 and 0.668 kPa) in a high altitude simulation facility. The motor chamber pressure measured in the low pressure cell (about 3.34 kPa) was corrected to that of a vacuum. The mechanism of the residual thrust is discussed. From the scale effect, the residual thrust of a large-scale motor corresponding to the H1-3rd stage motor is predicted from the results of these experiments. R.J.F.

N85-12088# National Aerospace Lab., Tokyo (Japan).
A STUDY ON DYNAMIC CHARACTERISTICS OF LIQUID OXYGEN PUMPS FOR ROCKET ENGINES Abstract Only
Takashi Shimura and Kenjiro Kamijo Apr. 1984 11 p refs In JAPANESE; ENGLISH summary
(NAL-TR-806; ISSN-0389-4010; Rept-2) Avail: NTIS HC A02/MF A01

Transfer matrix methods, which were applied to cavitating inducers, are used in order to examine the dynamic response of a centrifugal liquid oxygen pump with an inducer. An ultrasonic flow meter is used to measure the dynamic flow rate. A slit type perturbing valve is used to cause periodical oscillations in the pump flow. The major results of the present study are as follows: (1) Linearity of amplitude and phase exist in most parts of the experiment under high net positive suction head conditions; (2) The Z sub component of the pump transfer matrix was determined by two independent sets of data obtained by varying the helium gas volume in a vacuumjacketed cryogenic accumulator; and (3) The test results of the Z sub 12 component of the pump transfer matrix shows that dependency of Z sub 12 on frequency is small, and it was concluded that a quasistatic treatment of Z sub 12 is applicable on a centrifugal pump up to relatively high frequency regions. Author

N85-12089*# National Aeronautics and Space Administration, Washington, D. C.
LOX/LH2 PROPULSION SYSTEM FOR LAUNCH VEHICLE UPPER STAGE, TEST RESULTS
T. Ikeda, U. Imachi, Y Yuzawa, Y. Kondo, K. Miyoshi, and K. Higashino Sep. 1984 20 p refs Transl. into ENGLISH from Ishikawajima-Harima Eng. Rev. (Japan), v. 23, Jul. 1983 p 377-382

Original language document was announced as A84-14102 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-77727; NAS 1.15:77727; Rept-2) Avail: NTIS HC A02/MF A01 CSCL 21H

The test results of small LOX/LH2 engines for two propulsion systems, a pump fed system and a pressure fed system are reported. The pump fed system has the advantages of higher performances and higher mass fraction. The pressure fed system has the advantages of higher reliability and relative simplicity. Adoption of these cryogenic propulsion systems for upper stage of launch vehicle increases the payload capability with low cost. The 1,000 kg thrust class engine was selected for this cryogenic stage. A thrust chamber assembly for the pressure fed propulsion system was tested. It is indicated that it has good performance to meet system requirements. E.A.K.

N85-12090# Aerospace Corp., El Segundo, Calif.
DESCRIPTION AND USE OF THE SINGLE-COLOR TRANSMISSOMETER PLUME DIAGNOSTIC CODE A32CODE Final Report, Apr. 1983 - Jun. 1984
S. J. Young Aug. 1984 41 p
(Contract F04701-83-C-0084)
(AD-A146181; TR-0084(4623-02)-1; AFRPL-TR-84-048) Avail: NTIS HC A03/MF A01 CSCL 21/2

A description of and instructions for use of the code A32CODE for analysis of AFRPL single-color transmissometer data are presented. Author (GRA)

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

No abstracts in this category.

24 COMPOSITE MATERIALS

Includes laminates.

N85-12091 Virginia Polytechnic Inst. and State Univ., Blacksburg.
ACCELERATED VISCOELASTIC CHARACTERIZATION OF T300/5208 GRAPHITE-EPOXY LAMINATES Ph.D. Thesis
Mark E. Tuttle 1984 233 p
Avail: Univ. Microfilms Order No. DA8417839

An accelerated viscoelastic characterization scheme is applied to T300/5208 graphite-epoxy laminates. The viscoelastic response of unidirectional specimens is modeled using the theory developed by Schapery. The transient component of the viscoelastic creep compliance is assumed to follow a power law approximation. The viscoelastic response of T300/5208 graphite-epoxy at 149 C to transverse normal and shear stresses is determined using 90-deg and 10-deg off-axis tensile specimens, respectively. In each case the seven viscoelastic material parameters required in the analysis are determined experimentally, using a short-term creep/creep recovery testing cycle. A sensitivity analysis is used to select the appropriate short-term test cycle. It is shown that an accurate measure of the power law exponent is crucial for accurate long-term predictions. Based upon this analysis, a 480/120 minute creep/creep recovery test cycle is selected, and the power law exponent is calculated using creep data. A short-term test cycle selection procedure is proposed, which should provide useful guidelines when other viscoelastic materials are being evaluated. Dissert. Abstr.

N85-12092# National Aerospace Lab., Tokyo (Japan).
THERMAL DEFORMATION MEASUREMENTS OF HEAT-RESISTANT STRUCTURAL MATERIALS FOR AIRCRAFT BY ELECTRO OPTICAL DISPLACEMENT TRANSDUCER
Yoshio Aoki and Yasuo Tada May 1984 13 p refs In JAPANESE; ENGLISH summary
(NAL-TR-810; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

Using an Electro-Optical Displacement Transducer (EODT), thermal expansion tests ranging from room temperature up to 300 C were conducted with sheet specimens of glass/polyimide composite laminates. The relations between thermal expansion properties and temperatures in fiber directions 0, 45, and 90 degree as well as those of stacking sequence of layers and out-of-plane deformation in heating were obtained by employing heat-resistant markers as the optical targets of the EODT. The technique was adapted in thermal expansion and tension tests of titanium alloy (Ti-6Al-4V) specimens at temperatures ranging from room temperature to 500 C, and the result demonstrated the validity of the present technique. Author

N85-12093*# Celanese Research Co., Summit, N.J.
THERMOPLASTIC-CARBON FIBER HYBRID YARN
M. E. Ketterer Washington NASA Nov. 1984 30 p
(Contract NAS1-15749)
(NASA-CR-3849; NAS 1.26:3849) Avail: NTIS HC A03/MF A01 CSCL 11D

Efforts were directed to develop processing methods to make carbon fiber/thermoplastic fiber preforms that are easy to handle and drapeable, and to consolidate them into low void content laminates. The objectives were attained with the development of the hybrid yarn concept; whereby, thermoplastic fiber can be intimately intermixed with carbon fiber into a hybrid yarn. This was demonstrated with the intermixing of Celion 3000 with a Celanese liquid crystal polymer fiber, polybutylene terepthalate fiber, or polyetheretherketone fiber. The intermixing of the thermoplastic matrix fiber and the reinforcing carbon fiber gives a preform that can be easily fabricated into laminates with low void content. Mechanical properties of the laminates were not optimized; however, initial results indicated properties typical of a thermoplastic/carbon fiber composites prepared by more conventional methods. M.G.

N85-12094*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LONG-TERM THERMAL AGING OF 2 GRAPHITE-POLYIMIDE COMPOSITE MATERIALS
James B. Nelson 1984 28 p refs
(NASA-TP-2369; L-15849; NAS 1.60:2369) Avail: NTIS HC A03/MF A01 CSCL 11D

Two graphite/polyimide composite materials were aged in circulating air ovens at temperatures 204 C, 232 C, 260 C, and 288 C for various times up to 25000 hours. The composites were: (1) Celanese Celion 6000 graphite fiber and PMR-15 polyimide resin (Celion/PMR-15) and (2) Celion 6000 graphite fiber and LARC-160 polyimide resin (Celion/LARC-160). Three unidirectional specimen geometries were studied: short beam shear (SBS) specimens, flexure specimens, and 153 mm square panels. The interior regions of the square panels exhibited only minor property degradation. The individually aged SBS and flexure specimens exhibited large reductions in strengths after aging. Both laminate materials cracked and degraded preferentially at the specimen edge perpendicular to the fibers. Author

N85-12095*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
HIGH PERFORMANCE FIBERS FOR STRUCTURALLY RELIABLE METAL AND CERAMIC COMPOSITES
James A. DiCarlo 1984 16 p refs Presented at a Conf. on High Performance Textiles Structures, Philadelphia, 6-8 Jun. 1984; sponsored by The Fiber Soc. and SAMPE
(NASA-TM-86878; E-2339; NAS 1.15:86878) Avail: NTIS HC A02/MF A01 CSCL 11D

Very few of the commercially available high performance fibers with low densities, high Young's moduli, and high tensile strengths possess all the necessary property requirements for providing either metal matrix composites (MMC) or ceramic matrix composites

(CMC) with high structural reliability. These requirements are discussed in general and examples are presented of how these property guidelines are influencing fiber evaluation and improvement studies at NASA aimed at developing structurally reliable MMC and CMC for advanced gas turbine engines. A.R.H.

N85-12096*# Kentron International, Inc., Hampton, Va. Aerospace Technologies Div.
CHEMOVISCOSITY MODELING FOR THERMOSETTING RESINS - I Final Report
Tan-Hung Hou Nov. 1984 40 p refs
(Contract NAS1-16000)
(NASA-CR-172443; NAS 1.26:172443) Avail: NTIS HC A03/MF A01 CSCL 11D

A new analytical model for chemoviscosity variation during cure of thermosetting resins was developed. This model is derived by modifying the widely used WLF (Williams-Landel-Ferry) Theory in polymer rheology. Major assumptions involved are that the rate of reaction is diffusion controlled and is linearly inversely proportional to the viscosity of the medium over the entire cure cycle. The resultant first order nonlinear differential equation is solved numerically, and the model predictions compare favorably with experimental data of EPON 828/Agent U obtained on a Rheometrics System 4 Rheometer. The model describes chemoviscosity up to a range of six orders of magnitude under isothermal curing conditions. The extremely non-linear chemoviscosity profile for a dynamic heating cure cycle is predicted as well. The model is also shown to predict changes of glass transition temperature for the thermosetting resin during cure. The physical significance of this prediction is unclear at the present time, however, and further research is required. From the chemoviscosity simulation point of view, the technique of establishing an analytical model as described here is easily applied to any thermosetting resin. The model thus obtained is used in real-time process controls for fabricating composite materials. Author

N85-12097# North Carolina Agricultural and Technical State Univ., Greensboro. Dept. of Mechanical Engineering.
FATIGUE-IMPACT STUDIES IN LAMINATED COMPOSITES Final Report, 10 Sep. 1980 - 31 Dec. 1982
V. S. Avva Wright-Patterson AFB, Ohio AFWAL May 1983 152 p
(Contract F33615-80-K-3243)
(AD-A142841; AFWAL-TR-83-3060) Avail: NTIS HC A08/MF A01 CSCL 11/4

The residual strength of the impact-damaged laminates can be predicted using an analytical model. Both the power law and the wearout models appear to be useful in predicting the fatigue life of the composite laminates. However, because of the slope parameter, the wearout model appears to have a slight edge over the power law model, particularly at low fatigue life and higher applied stress. The strength degradation due to cyclic loading in notched laminates was found to be extremely small up to a million cycles. The residual strength of the fatigue-damaged laminates was found to increase (in proportion to the applied maximum stress with $R = 0.1$) after a million fatigue cycles. Impact loading followed by cyclic loading was found to be more damaging (in reducing the life of the laminate) than the reversed sequence of loading. The magnitude of the minimum projectile velocity causing catastrophic failure in the laminates tested was found as a function of the applied stress and the number of fatigue cycles. GRA

N85-12098# Dayton Univ., Ohio.
A DIGITAL ALGORITHM FOR COMPOSITE LAMINATE ANALYSIS: FORTRAN, REVISED Final Technical Report, 1 Jul. 1982 - 30 Jun. 1983
S. R. Soni Wright-Patterson AFB, Ohio AFWAL Oct. 1983 150 p
(Contract F33615-81-C-5056)
(AD-A145833; AFWAL-TR-81-4073-Rev) Avail: NTIS HC A07/MF A01 CSCL 11/4

This report presents a FORTRAN computer code for the solution of composite materials problems. The computer program can conduct the point stress analysis of general laminates including hybrid laminates. The effect of hygrothermal and mechanical loads on the strength of composite laminates can be studied using this program. Strength predictions on the basis of six commonly used failure theories can be done. Plotting capabilities have been included-using a CALCOMP Plotter to obtain the failure envelopes in different loading planes for all the failure theories. A complete listing of the computer program is given. A number of typical laminates have been treated for numerical and graphical illustrations. Input and output parameters are explained in detail. The algorithm is written in an easily understandable format. Material properties for five different materials are stored in the program. The required material can be used by giving the material name for pure laminates and material property identification number in the layers data card for hybrid laminates. These quantities are given in SI units. If the results are desired in English units (i.e., Psi etc.), a unit identification command has to be used in the appropriate place. This program is a modified version of an earlier program given in AFWAL-TR-81-4073 (AD-A108201). GRA

N85-12099# Pennsylvania Univ., Philadelphia.
FUNDAMENTAL ELECTRONIC PROPERTIES OF DONOR-TYPE GRAPHITE INTERCALATED COMPOUNDS Final Report, 1 Oct. 1980 - 31 Mar. 1984
S. Rabii and J. E. Fischer 1 Aug. 1984 56 p
(Contract DAAG29-80-K-0019)
(AD-A146148; ARO-17299.18-PH) Avail: NTIS HC A04/MF A01 CSCL 11/2

Graphite intercalation compounds are a large family of quasi-two dimensional synthetic metals. Fundamental interest centers on their unusual crystal structures and their effects on electronic properties. Practical applications are envisaged as lightweight conductors of electricity. The goals of this program are to understand the electronic structure of donor-type compounds, with a view toward obtaining detailed correlations between chemical and physical variables. Emphasis is placed on the one-electron spectrum, transport and optical properties and charge distributions. Synthetic methods are developed to provide high-quality specimens for a variety of physical measurements. Band theoretical techniques are applied to develop models for the electronic structure. Iteration between theory and experiment leads to more sophisticated models. GRA

N85-12100# Societe Nationale Industrielle Aerospatiale, Suresnes (France). Lab. Central.
INFLUENCE OF TEST METHOD AND MATERIAL STIFFNESS ON THE DAMAGE PRODUCED BY LOW VELOCITY IMPACTS ON CARBON-EPOXY COMPOSITES NO. 45.387/1 [INFLUENCE DE LA METHODE D'ESSAI ET DE LA RIGIDITE DU MATERIAU SUR LES DOMMAGES OCCASIONNES PAR LES CHOCS A BASSE VITESSE SUR COMPOSITES CARBONE EPOXY. PROCES VERBAL NO. 45.387/1]
G. Hilaire and B. Soulezelle 29 Feb. 1984 23 p In FRENCH
(Contract STPA-83.96003)
(Rept-45.387/1) Avail: NTIS HC A02/MF A01

Impact damage on carbon-epoxy composites was studied as a function of specimen dimension, initial damage energy threshold, specimen deformation and projectile mass. Analysis shows that the free length of the specimen has a marked influence on the results, and that the measure of the deformation under impact correlates well with predictions. Author (ESA)

N85-12101# Societe Nationale Industrielle Aerospatiale, Suresnes (France). Direction Centrale Industrielle.
GENERAL STUDIES ON COMPOSITE MATERIALS. EVALUATION OF AUXILIARY PRODUCTS OF NATIONAL ORIGIN Final Report [ETUDES GENERALES SUR LES MATERIAUX COMPOSITES. EVALUATION DE PRODUITS D'ENVIRONNEMENT D'ORIGINE NATIONALE]
B. Martinie 10 May 1984 31 p refs In FRENCH
(Contract STPA-83.96.003)
(SNIAS-2500/DCI-PR/84) Avail: NTIS HC A03/MF A01

The possibility of substitution of auxiliary materials used in the

manufacture of carbon-epoxy composites was studied in order to reduce costs and to encourage local procurement. Nylon diaphragms used in molding were substituted by silicone elastomeric diaphragms. A waterproofing resin was substituted by a silicone rubber. The advantages of the substitutions are demonstrated. Author (ESA)

N85-12102# Societe Nationale Industrielle Aerospatiale, Suresnes (France). Lab. Central.
STUDY OF DELAMINATION CRACKING UNDER STATIC AND CYCLIC LOADS OF CARBON-EPOXY COMPOSITE MATERIALS [ETUDE DE LA FISSURATION PAR DELAMINAGE SOUS SOLLICITATIONS STATIQUES ET CYCLIQUES DE MATERIAUX COMPOSITES CARBONE-EPOXY. PROCES VERBAL NO. 42-787/F]
M. Vancon and C. Bathias 13 Apr. 1984 81 p refs In FRENCH
(Contract DRET-81.341.83.00)
(Rept-42-727/F) Avail: NTIS HC A05/MF A01

Layer separation mechanisms in carbon epoxy composites were studied to help in the interpretation of fracture photography. Tension and shear layer separation are considered. Elementary models are proposed based on the combination of accurate observation of load parameters with the images furnished by the optical microscope, the scanning microscope, and X-rays. It is shown that the tomodensitometry is the best method to study delamination. Author (ESA)

N85-12103# Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Composite Materials and Structures.
MODELING THE STRESS FIELD IN LAMINATED COMPOSITE PLATES NEAR DISCONTINUITIES
E. R. Johnson and B. L. Kemp 1984 42 p refs
(PB84-219237; VPI/E-84/21; CCMS-84/09) Avail: NTIS HC A03/MF A01 CSCL 11D

A structural model is developed using Reissner's variational principle to analyze stress gradient problems in laminated composite plates. A statically admissible stress field, which has explicit dependence on the thickness coordinate, is selected for each layer. Both interlaminar traction and displacement continuity are enforced between layers. This model is similar to an earlier one developed by Pagano, but has four dependent variables less per layer than Pagano's model. It is shown that the model can duplicate Pagano's results for the same number of subdivisions through the thickness. The uniform axial extension of a (0/90) sub a laminate is used as the example problem for comparison to Pagano's theory and to illustrate the methodology. Author (GRA)

N85-12269# Joint Publications Research Service, Arlington, Va.
REINFORCEMENT OF MOLYBDENUM DISILICIDE WITH NEMATIC CRYSTALS OF ALUMINUM OXIDE Abstract Only
G. I. Zakharova, S. S. Ordanyan, V. N. Paderno, G. N. Smolina, and Ye. S. Vinogradova *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 49 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Neorgan. Materialy (Moscow), v. 20, no. 7, Jul. 1984 p 1143-1147 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N85-12104# National Bureau of Standards, Gaithersburg, Md. Center for Fire Research.
NEW CONCEPTS FOR MEASURING FLAME SPREAD PROPERTIES
J. G. Quintiere and M. Harkleroad Nov. 1984 157 p refs Sponsored in part by DOT
(NBSIR-84-2943) Avail: NTIS HC A08/MF A01

An experimental procedure is described which can be used to derive data relevant to the prediction of ignition and flame spread on materials. The apparatus utilizes a radiant heat source. The test results pertain to piloted ignition of a vertical sample under constant irradiation, and to lateral flame spread on a vertical surface due to an external applied radiant heat flux. The results can be used to display the maximum velocity and ignition time as function of irradiance. Critical or minimum irradiances for spread and ignition are determined. An empirical correlation is found to relate the ignition data and to provide a more general interpretation for the flame spead results. Further analyses of the data yield effective values for the thermal inertia of the material, its ignition temperature, and a parameter related to flame temperature. These parameters appear to be phenomenological constants for each material, rather than factors dependent on the apparatus. Results are presented for a wide range of materials. Suggestions for extending the results to other flame spread conditions are presented. Author

N85-12105# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Macromolecular Science.
STRUCTURE OF SILANE COUPLING AGENTS ADSORBED ON SILICON POWDER
S. R. Culler, H. Ishida, and J. L. Koenig 4 Sep. 1984 44 p
(Contract N00014-80-C-0533)
(AD-A145803; CWRU/DMS/TR-5) Avail: NTIS HC A03/MF A01 CSCL 07/4

The molecular structure of gamma-aminopropyltriethyoxysilane (gamma-APS) coupling agent were studied on silicon powder by diffuse reflectance FT-IR spectroscopy. The coupling agents are chemically bound to the surface in two ways; (1) the Si-OH groups forming Si-O-Silicon bonds; and (2) hydrogen bonding through the chemisorbed silane molecules (interacting directly with the substrate) and the physisorbed silane molecules. GRA

N85-12106# Rockwell International Corp., Anaheim, Calif. Science Center.
ELECTROCHEMISTRY OF RARE-EARTH DIPHTHALOCYANINES Final Report, 1 May 1983 - 30 Apr. 1984
M. M. Nicholson and T. P. Weismuller Jul. 1984 25 p
(Contract F49620-83-C-0088)
(AD-A145813; SC5383.1FR; AFOSR-84-0769TR) Avail: NTIS HC A02/MF A01 CSCL 07/4

Lutetium diphthalocyanine films on tin oxide electrodes in several aqueous chloride electrolytes were investigated by cyclic voltammetry and in situ visible-range absorption spectroscopy at controlled potentials. Although several redox processes of the dye film were evident in the voltammograms, they were more clearly resolved in the spectroelectrochemical data, from which equilibrium potentials corresponding to fifty percent conversion between successive oxidation states were determined. GRA

N85-12107# TRW Space Technology Labs., Redondo Beach, Calif.
STUDY OF SINGLET OXYGEN-PENTAVALENT PHOSPHORUS REACTIONS Final Report, Apr. 1982 - May 1984
L. J. Marabella, J. Kuper, C. Lovejoy, and J. Betts 30 May 1984 37 p
(Contract F49620-82-C-0045)
(AD-A145896; AFOSR-84-0499TR) Avail: NTIS HC A03/MF A01 CSCL 07/4

Detailed studies of an atomic oxygen-singlet oxygen-dimenthyl hydrogen phosphite (DMHP) gas phase reaction system have been performed. Decay of singlet delta oxygen was modeled and a reaction mechanism which explains the experimental observations was derived. Semilog plots of O2 singlet delta emission intensities in the presence of O-atoms and DMHP versus time obtained show an initial rise in the emission followed by a straight line decay. GRA

N85-12108# Illinois Univ., Urbana. Urbana.
RAMAN SCATTERING FROM METASTABLE (GASB)1-XGE2X ALLOYS
R. Beserman, J. E. Greene, M. V. Klein, T. N. Krabach, and T. C. McGlinn 1984 5 p
(Contracts N00014-79-C-0424; N00014-80-C-0701)
(AD-A145897) Avail: NTIS HC A02/MF A01 CSCL 07/4

Raman Scattering has bven used to reveal structural information in mixed, metastable, crystalline Ga-Ge-Sb alloys. These alloys deposited on GaAs substrates using a multitarget R.F. sputtering system. GRA

N85-12109# Aerospace Corp., El Segundo, Calif. Vehicle Engineering Div.
PARTICLE SIZE DISTRIBUTION ON SURFACES IN CLEAN ROOMS Final Technical Report, Sep. 1983 - Feb. 1984
O. Hamberg and E. M. Shon 30 Apr. 1984 27 p
(Contract F04701-83-C-0084)
(AD-A146057; TR-0084(4902-06)-1; SD-TR-84-34) Avail: NTIS HC A03/MF A01 CSCL 07/4

Experimental particle size distributions of surfaces in clean rooms, resulting from the gravity settling of airborne particulates (fallout), are presented and found to be significantly different from the distributions described by Military Standard 1246A. Theoretical surface size distributions, based on fallout from a Federal Standard 209B airborne particle distribution, are derived and show good correlation with experimental data. Further experimental data and analysis are provided to show that surface cleaning tends to make a particle size distribution resulting from fallout approach the MIL-STD-1246A distribution. Recommendations are made to limit the use of MIL-STD-1246A, when specifying surface cleanliness levels, to surfaces that have been cleaned after exposure to fallout. GRA

N85-12110# New Hampshire Univ., Durham. Dept. of Physics.
NAK CHEMILUMINESCENCE Interim Technical Report
J. J. Wright and L. C. Balling 20 Sep. 1984 10 p
(Contract N00014-83-K-0533)
(AD-A146077; TR-2-ONR) Avail: NTIS HC A02/MF A01 CSCL 20/6

The gas phase reaction between a mixture of K and Na and CBr4 produces, under low density conditions, emission from high-lying vibrational levels of the B state of NaK. Author (GRA)

N85-12111# Ballistic Research Labs., Aberdeen Proving Ground, Md.
RAMAN AND FLUORESCENCE SPECTROSCOPY IN A METHANE-NITROUS OXIDE LAMINAR FLAME Final Report
J. A. Vanderhoff, W. R. Anderson, A. J. Kotlar, and R. A. Beyer Aug. 1984 41 p
(AD-A146092; AD-F300477; ARBRL-TR-02579) Avail: NTIS HC A03/MF A01 CSCL 21/2

Using the prism selected lines of argon and krypton lasers, temperature and concentration profiles through the reaction zone of a premixed laminar methane-nitrous oxide flame have been obtained from the Raman signals for N(2), H(2)O and CH(4). Fluorescence signals from HN, OH, CN and NCO have also been observed. These signals have been assigned to specific pumping transitions where possible and also converted to relative concentration profiles. Estimates of the absolute concentrations are also determined. Loss rates for these radical species were obtained by assuming overall first-order kinetics. The experimentally determined temperatures and species concentrations are compared with thermochemical equilibrium calculations. GRA

N85-12112# Brown Univ., Providence, R. I. Dept. of Chemistry.
STABILITY OF SEVERAL SUBSTITUTED FERRITES IN A REDUCING ATMOSPHERE
Y.-T. Qian, R. Kershaw, S. Soled, K. Dwight, and A. Wold 1 Aug. 1984 18 p
(Contract N00014-77-C-0387)
(AD-A146108; TR-29) Avail: NTIS HC A02/MF A01 CSCL 07/4

The stability of alpha Fe2O3 and a number of ferrites were studied in a reducing atmosphere of 85% Ar/15% H2. The reduction processes were followed by both thermogravimetric and X-ray analyses. These results allowed for the unambiguous characterization of the reduction processes. A relationship between the nature of the products and the reduction process is proposed. Author (GRA)

N85-12113# Washington Univ., Seattle. Dept. of Chemistry.
HIGH TEMPERATURE GAS ENERGY TRANSFER Annual Summary Report, 1 Aug. 1983 - 31 Jul. 1984
B. S. Rabinovitch 7 Sep. 1984 25 p
(Contract N00014-75-C-0690)
(AD-A146134) Avail: NTIS HC A02/MF A01 CSCL 07/4

Study of the transfer of vibrational energy between molecules and surfaces was continued at high levels of vibrational excitation and high surface temperature. Metal and liquid surfaces have been examined. Results are outlined. GRA

N85-12114# Armed Forces Food Science Establishment, Scottsdale (Australia).
EVALUATION OF SURVIVAL STRAWS (POCKET PURIFIER)
G. F. Thomson and G. Driver Jun. 1984 12 p
(AD-A146240; AD-E750896) Avail: NTIS HC A02/MF A01 CSCL 06/7

This report is a preliminary report of microbiological studies on Survival Straws (Pocket Purifier). The trial was undertaken as part of the overall study on water purification systems. The Survival Straw is used by placing the bottom end in water and drawing water through the tube as with an ordinary drinking straw. The straw as housed in a protective casing is 21 cm long and 1.6 cm in diameter. There are three main sections in a straw. The first is a primary inlet filter to remove suspended particle matter. The second is a halogenated polystyrene divinyl-benzene quarternary ammonium anion resin containing 38% iodine. This section is alleged to kill microorganisms. The third is a purifying medium of carbon to remove impurities and make the water palatable. Preliminary results raise some doubts as to the bactericidal efficiency of Survival Straws. The possible inactivation of the bactericidal resin in the straw by the Simulated Contaminated Water employed, would need to be investigated before further studies could proceed. GRA

N85-12115# Federal Aviation Agency, Atlantic City, N.J.
THE PYROLYSIS TOXIC GAS ANALYSIS OF AIRCRAFT INTERIOR MATERIALS Final Report, Jun. 1980 - Nov. 1981
T. M. Guastavino, L. C. Speitel, and R. A. Filipczak Apr. 1982 49 p
(AD-A146285; DOT/FAA/CT-82/13) Avail: NTIS HC A03/MF A01 CSCL 21/2

Selected aircraft interior materials previously reported are tested by a new methodology. Gas and ion chromatographs linked to computers are utilized to identify and quantify gases evolved from a specific thermal exposure. Results are compared to those reported by other methods and instruments. Time concentration profiles are utilized to Fingerprint and identify the material by this test evaluation. Author (GRA)

N85-12116# Argonne National Lab., Ill. Chemistry Div.
MAGNETIC RESONANCE STUDIES OF TRANSIENT RADICALS AND RADICAL IONS
A. D. Trifunac 1984 3 p refs Presented at the 22nd Congr. Ampere on Magnetic Resonance and Related Phenomena, Zurich, 10-15 Sep. 1984
(Contract W-31-109-eng-38)
(DE84-011699; CONF-840976-1) Avail: NTIS HC A02/MF A01

Radical ions produced by pulse radiolysis and laser photoionization of hydrocarbon solvents and solutes were studied by picosecond optical absorption, dc conductivity and optically detected magnetic resonance. DOE

N85-12117# Los Alamos Scientific Lab., N. Mex.
OPTICAL DETECTION OF ALKALI COMPOUNDS

R. C. Oldenborg, S. L. Baughcum, and F. B. Wampler 1984 9 p Presented at the AR and TD and Surface Coal Gasification Instrumentation Projects Contractors' Meeting, Morgantown, W. Va., 12-14 Jun. 1984
(Contract W-7405-eng-36)
(DE84-015505; LA-UR-84-2168; CONF-840694-1) Avail: NTIS HC A02/MF A01

A laser-based optical diagnostic technique is described which should be applicable to the direct monitoring of trace levels of alkali compounds within the stream of a coal gasifier. The diagnostic is based on the observation that atomic emission is detected from alkali metals upon ultraviolet photodissociation of the parent compound. From the intensity of the atomic emission, the known absorption cross section of the parent compound, and the laser fluence, the concentration of the alkali compounds can be determined over an extreme range of conditions and their chemistry can be elucidated. KCl vapor was irradiated with an ArF laser that was Raman-shifted in both H2 and D2. The 766.5-nm atomic potassium emission (4(2)P) was observed for all excitation wavelengths between 193 and 225 nm. The relative production efficiency drops dramatically for energies below the calculated threshold wavelength of 207 nm. An absolute detection sensitivity for KCl was determined at 0.2 ppB, which is better than required for anticipated fossil fuel monitoring applications. DOE

N85-12118# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
MICROFLUORESCENCE STUDIES OF ZIRCONIUM OXIDE
T. E. Doyle and J. I. Alvarez 1984 12 p refs Presented at Microbeam Analysis Soc. Analytical Electron Microscop. Meeting, Bethlehem, Pa., 19 Jul. 1984
(Contract DE-AC07-76ID-01570)
(DE84-016116; EGG-M-05584; CONF-840767-4) Avail: NTIS HC A02/MF A01

Yttrium fluorescence in the various crystalline phases of ZrO2 was examined. This work was a direct result of micro-Raman analysis of filter debris samples from Power Burst Facility. The yttrium fluorescence in the micro-Raman spectra provides a method for differentiating between fabricated zirconia and oxidized fuel-rod cladding. From the spectra it is concluded that some of the observed cubic ZrO2 in the samples was not from fabricated zirconia and is probably oxidized fuel-rod cladding. This work also suggests a novel and unexplored line of research in fission-product chemistry and detection. DOE

N85-12119# Technische Hochschule, Darmstadt (West Germany). Inst. fuer Chemische Technologie.
INFLUENCE OF STRUCTURAL PARAMETERS OF ZEOLITE CATALYSTS ON THEIR ACTIVITY AND SELECTIVITY Final Report, Dec. 1981
Claus-Peter Haelsig, Heinz Litterer, Peter Kredel, Theo Fleckenstein, Buchenhorst, Klaus Belendorff, and Juergen Kahl Bonn Bundesministerium fuer Forschung und Technologie Nov. 1983 108 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-83-253; ISSN-0340-7608) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany, DM 22,50

The influence of modifications of H-mordenite catalysts on their activity and selectivity was studied using isomerization of n-Hexane and of n-Hexene, and disproportionation of toluene. The properties of zeolites as catalysts depend on the ratio ViO2/Al2O3 and can be varied in a defined way by temperature treatment, addition of platinum and treatment in fixed beds of different geometry. Using the results, it is possible to select suitable modifications of H-mordenite catalysts for the mentioned reactions. Author (ESA)

N85-12120# Battelle Inst., Frankfurt am Main (West Germany).
RESEARCH AND DEVELOPMENT WORK ON A SINGLE CATION SPECIFIC MEMBRANE FOR THE RECOVERY OF RAW MATERIALS WITH ELECTRODIALYSIS Final Report, Sep. 1983
Claus Tiby, Heinz Behret, Werner Ronge, Horst Binder, Heinrich Deibig, and Albrecht Dinkelacker Bonn Bundesministerium fuer Forschung und Technologie Aug. 1984 58 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-84-163; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 12

Homogeneous organic membranes with various copper complexes were produced by polymerization or condensation. Three experimental set ups were developed to investigate the copper-ion transport properties. Membranes produced on the basis of 8-hydroxy-chinoline complexes (N2O2 - complexes) show no specific copper transport properties. For membranes characterized by oxygen binding ligands (ionotrope membrane, Cu-salicylaldehyde membrane, Cu-malein-acid-membrane) a preferred Cu2+-ion transport up to 38% is found over a period of 30 hr. Author (ESA)

N85-12121# Battelle Inst., Frankfurt am Main (West Germany).
TRANSPORT PHENOMENA IN THE BOUNDARY LAYER DURING SOLUTION SOLIDIFICATION UNDER MICROGRAVITY. ICE GROWTH FROM A WATER-SALT SOLUTION Final Report, Dec. 1983
Claus Tiby, Hartmut Erdmann, Langbein, and Heinz Behret Bonn Bundesministerium fuer Forschung und Technologie Aug. 1984 97 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-84-031; ISSN-0170-1339) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 20,50

A laboratory cell was constructed to investigate ice growth in a water-salt solution. A Mach-Zehnder interferometer is used to determine the growth-velocity of the icefront and to measure the quasistatic density in front of the ice crystal. The vertical temperature profile across the cell can be examined with thermistors. Results of examination of the salt diffusion layer agree qualitatively with theoretical calculations. The quantitative difference shows the influence of microgravity. Author (ESA)

N85-12749# Mainz Univ. (West Germany).
STRUCTURE AND KINETICS OF PHYSISORPTION, PROPERTIES OF HELIUM DURING REDUCTION OF THE DIMENSION [STRUKTUR UND KINETIK BEI PHYSISORPTION, EIGENSCHAFTEN VON HELIUM BEI REDUZIERUNG DER DIMENSION]
H. Wiechert, R. Feile, H. J. Lauter (ILL, Grenoble, France), J. Schaab, and C. Tiby *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1984-1982 Mar. 1984 p 696-706 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N85-12122 British Library Lending Div., Boston Spa (England).
THE EFFECT OF HEAT TREATMENT ON WEAR RESISTANCE OF GAS-PLASMA EUTECTIC COATINGS
V. E. Panarin and O. V. Mikuljak 18 Jul. 1984 3 p refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved. (USSR), v. 11, 1983 p 163-164
(BLL-M-35756-(5828.4)) Copyright. Avail: British Library Lending Div., Boston Spa, England

Gas-plasma coatings was analyzed to improve the quality of annealing and its tribotechnical properties. The possibility of a significant improvement of the quality of gas plasma coatings, and structure, a increase in plasticity, durability, and adhesion was determined during sublimation in a controlled atmosphere, and also after the application of heat treatment to the coating. The effect of heat treatment on the wear resistance of plasma coatings is not identical. It is shown that the layer structure of coatings

consists of badly etched white layers and particles of round and irregular shape preserving their eutectic structure. The tribotechnical properties of plasma coatings of powder of eutectic alloys with a steel base hardened with refractory borides and caroides is studied. The microscopic analysis of samples tested for friction and the micromechanical investigation of the structural components of the coating explain the mechanism of erosion. E.A.K.

N85-12123 British Library Lending Div., Boston Spa (England).
THE INFLUENCE OF ALUMINUM ON THE QUALITIES OF LOW AND MEDIUM CARBON STEEL
E. N. Lebelev, L. V. Azarova, and I. I. Bornatskij 18 Jul. 1984 3 p ref Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved. (USSR), v. 11, 1983 p 161
(BLL-M-35754-(5828.4)) Copyright. Avail: British Library Lending Div., Boston Spa, Engl.

Experiments were made to investigate the relationship between the proportions of aluminum and carbon in steel with regard to its characteristics when rolled. Author

N85-12124 British Library Lending Div., Boston Spa (England).
FEASIBILITY OF THE ELECTROCHEMICAL METHOD OF DETERMINING NITROGEN CONTENT IN METALLIC MELTS
V. T. Beshkarev, Yu. V. Tarakanov, and B. V. Linnchevskii 18 Jul. 1984 7 p refs Transl. into ENGLISH from Izv. (USSR) p 10-13
(BLL-M-35730-(5828.4)) Copyright. Avail: British Library Lending Div., Boston Spa, Engl.

Laboratory experiments on the determination of nitrogen activity in molten iron with the aid of a AlN solid electrolyte and a Cr-Cr2N, Mo, PN2 reference electrode are described. The proposed arrangement enables the activity to be measured, the results agreeing well with those of vacuum fusion when the metal oxygen content was low. The accuracy is also dependent on the metal aluminum content because of effects connected with the solid electrolyte. Author

N85-12125 United Kingdom Atomic Energy Authority, Risley (England).
STRESS CORROSION OF PRESSURE VESSEL STEEL A533-B IN HIGH TEMPERATURE WATER
B Rosborg 5 Jul. 1984 6 p refs Transl. into ENGLISH of "Spanningskorrosion i Tryckkarilsstalet A533-B i Hogtehperaturvatten" rept. E1-80-80 Studsvick, 21 Aug. 1980 9 p Original language document was announced as N83-70975
(BLL-Risley-TR-4600-(9091.9F); Rept-E1-80-80) Copyright. Avail: British Library Lending Div., Boston Spa, Engl.

The contribution from stress corrosion to crack formation in BWR feedwater nozzles as a result of thermal fatigue is addressed. Stress corrosion can be produced in pressure vessel steel A533-B exposed to water containing oxygen at high temperatures, during accelerated laboratory testing. Tests on pressure vessel steel A533-B in high temperature water show that the oxygen content of the water and the loading conditions are very important in relation to stress corrosion: cracking was found in water with 8 ppm O2 but not in water with < or = 10 ppb O2 and under progressive deformation at high loads but not under static loading conditions. M.G.

N85-12126# Materials Research Labs., Melbourne (Australia).
WELD METAL SOLIDIFICATION CRACKING IN A CARBON-MANGANESE STEEL
B. Dixon [1984] 15 p refs
Avail: NTIS HC A02/MF A01

Weld metal solidification cracking is a significant problem in the welding of steels. Extensive solidification cracking occurred during the fabrication of a steel pipeline which was supposed to be manufactured in accordance with stringent specifications. The cracks were first discovered on parts of the longitudinal welds where they abutted circumferential welds, and extensive metallography and electron microprobe analysis showed that they were associated with phosphorus enriched segregates. The pipes were subsequently inspected by the manufacturers and repaired. The object of the current investigation was to accurately define the cause of cracking in this instance so that potential problems in the welded construction of naval vessels might be avoided by control of weld process parameters and chemistry of the consumables. B.W.

N85-12127*# National Aeronautics and Space Administration, Washington, D. C.
INFLUENCE OF ALUMINUM OXIDE FILM ON THERMOCOMPRESSION BONDING OF GOLD WIRE TO EVAPORATED ALUMINUM FILM
Seiichi Iwata, Akitoshi Ishizaka, and Hiroshi Yamamoto Oct. 1984 25 p refs Transl. into ENGLISH from Nippon Kinzoku Gakkaishi (Japan), v. 45, no. 6, 1981 p 603-609 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Hitachi Litd., Kokubunji, Japan
(Contract NASw-3541)
(NASA-TM-77503; NAS 1.15:77503) Avail: NTIS HC A02/MF A01 CSCL 11F

The influence of Al surface condition on the thermocompression bonding of Au wires to Al electrodes for integrated electric circuits was studied. Au wires were connected to Al electrodes by nail-head bonding after various Al surface treatments. Bonding was evaluated by measuring the wire pull strength and fraction of the number of failures at Au-Al bonds to the total number of failures. Dependence of the fraction on applied load was derived theoretically with a parameter named critical load to take into consideration the differences in Al surface condition. The relation also held explicately for various surface treatments. Characterization of the Al surface was carried out by electron microscopy for chemical analysis. Author

N85-12128*# National Aeronautics and Space Administration, Washington, D. C.
EFFECT OF RHENIUM ON THE STRUCTURE AND PROPERTIES OF THE WELD METAL OF A MOLYBDENUM ALLOY
V. V. Dyachenko, B. P. Morozov, M. A. Tylkina, Ye. M. Savitskiy, and V. V. Nikishanov Jul. 1984 10 p refs Transl. into ENGLISH from the book "Renii v Novoy Tekhnike" Moscow, Nauka Press, 1970 p 93-97 Original language document was announced as A71-20245 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-77491; NAS 1.15:77491) Avail: NTIS HC A02/MF A01 CSCL 11F

The structure and properties of welds made in molybdenum alloy VM-1 as a function of rhenium concentrations in the weld metal were studied. Rhenium was introduced into the weld using rhenium wire and tape or wires of Mo-47Re and Mo-52Re alloys. The properties of the weld metal were studied by means of metallographic techniques, electron microscopy, X-ray analysis, and autoradiography. The plasticity of the weld metal sharply was found to increase with increasing concentration of rhenium up to 50%. During welding, a decarburization process was observed which was more pronounced at higher concentrations of rhenium. Author

N85-12129*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EFFECTS OF TIN ON MICROSTRUCTURE AND MECHANICAL BEHAVIOR OF INCONEL 718
Robert L. Dreshfield, Walter A. Johnson, and Gernant A. Maurer 1984 13 p refs Presented at the TMS-AIME Fall Meeting, Detroit, 17-20 Sep. 1984
(NASA-TM-86866; E-2329; NAS 1.15:86866) Avail: NTIS HC A02/MF A01 CSCL 11F

Columbium, for which the United States is 100 percent import reliant, is of strategic importance to the U.S. aerospace industry. A major amount of the Cb is used in Inconel 718. Should Cb sources be disrupted, it may be desired to use a grade of Cb melting stock having greater Sn content then the preferred vacuum rade. Additions of Sn to Inconel 718 were varied from none added to 1 wt %. The Sn additions below 800 ppm had no detrimental effects on 650 C stress rupture behavior; however,

1-wt % Sn severely degraded both life and ductility. Additions of Sn in excess of 200 ppm were slightly detrimental to the 425 C tensile yield strength and ductility. The Sn additions had no effect on the microstructure of Inconel 718 even after stress rupture testing for over 6000 hr at 650 C. R.S.F.

N85-12130*# Cincinnati Univ., Ohio.
HIGH TEMPERATURE LOW-CYCLE FATIGUE MECHANISMS IN SINGLE CRYSTALS OF NICKEL-BASED SUPERALLOY MAR-M 200 Final Report
Walter W. Milligan (Georgia Inst. of Technology, Atlanta) and N. Jayaraman Oct. 1984 59 p refs
(Contract NsG3-506)
(NASA-CR-174739; NAS 1.26:174739) Avail: NTIS HC A04/MF A01 CSCL 11F

Twenty three high temperature low-cycle fatigue tests were conducted on single crystals of the nickel-based superalloy Mar-M 200. Tests were conducted at 760 and 870 C. SEM fractography and transmission electron microscopy were used to determine mechanisms responsible for the observed orientation dependent fatigue behavior. It has been concluded that the plastic characteristics of the alloy lead to orientation-dependent strain hardening and fatigue lives at 760 C. At 870 C, the elastic characteristics of the alloy dominated the behavior, even though the plastic strain ranges were about the same as they were at 760 C. This led to orientation-dependent fatigue lives, but the trends were not the same as they were at 760 C. Author

N85-12131*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THE EFFECTS OF Cr, Co, Al, Mo AND Ta ON THE CYCLIC OXIDATION BEHAVIOR OF A PROTOTYPE CAST NI-BASE SUPERALLOY BASED ON A 2(5) COMPOSITE STATISTICALLY DESIGNED EXPERIMENT
Charles A. Barrett 1984 20 p refs Presented at the High Temp. Corrosion in Energy Systems 7, Detroit, 17 Sep. 1984; sponsored by AIME and ASM
(NASA-TM-83784; E-2280; NAS 1.15:83784) Avail: NTIS HC A02/MF A01 CSCL 11F

A series of cast Ni-base superalloys were systematically varied at selected levels of Co, Cr, Mo, Ta, and Al. The elemental levels varied were Mo, 0 to 4 percent; Cr, 6 to 18 percent; Co, 0 to 20 percent, Ta, 0 to 8 percent; and Al, 3.25 to 6.25 percent. The cyclic oxidation resistance was determined from specific weight change data as a function of time for 1 hr cycles in static air at 1100 C. The significant terms in decreasing order of their importance were Al, Ta, Cr2, Al-Cr, Cr-Co, Co2, Al-Mo, Cr-Mo, Al-Al, and Mo-Ta. The Al term alone accounted for close to 82 percent of the explained variability. The estimating equation showed that the Al level was the most important and should be at its 6.25 wt % maximum value. The Mo and Ta levels should also be at their maximum 4 and 8 wt % respectively. The cobalt composition should be as low as possible, i.e., 0 wt%. The Cr level optimum varies depending on the other 4 levels. The X-ray diffaction results indicate the most protective scales are alumina/aluminate spinel stabilizized with a tri-rutile oxide high in Ta and Mo. R.S.F.

N85-12132*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
UNIVERSAL BINDING ENERGY RELATIONS IN METALLIC ADHESION
John Ferrante, John R. Smith (General Motors Research Labs.), and James J. Rose (Iowa State Univ., Ames) 1984 14 p refs Presented at the Materials Research Society Ann. Meeting, Boston, 27-29 Nov. 1984
(NASA-TM-86889; E-2354; NAS 1.15:86889) Avail: NTIS HC A02/MF A01 CSCL 11F

Rose, Smith, and Ferrante have discovered scaling relations which map the adhesive binding energy calculated by Ferrante and Smith onto a single universal binding energy curve. These binding energies are calculated for all combinations of Al(111), Zn(0001), Mg(0001), and Na(110) in contact. The scaling involves normalizing the energy by the maximum binding energy and normalizing distances by a suitable combination of Thomas-Fermi screening lengths. Rose et al. have also found that the calculated cohesive energies of K, Ba, Cu, Mo, and Sm scale by similar simple relations, suggesting the universal relation may be more general than for the simple free electron metals for which it was derived. In addition, the scaling length was defined more generally in order to relate it to measurable physical properties. Further this universality can be extended to chemisorption. A simple and yet quite accurate prediction of a zero temperature equation of state (volume as a function of pressure for metals and alloys) is presented. Thermal expansion coefficients and melting temperatures are predicted by simple, analytic expressions, and results compare favorably with experiment for a broad range of metals. B.W.

N85-12133# Defence Research Information Centre, Orpington (England).
EFFECTS OF INTRODUCTION OF ALKYL GROUPS INTO ALUMINIUM ANODIZED COATINGS
C. Yoshimura, H. Noguchi, and S. Ito Jul. 1984 11 p refs Transl. into ENGLISH from Keikinzou (Japan), v. 2, no. 3, 1978 p 138-141
(DRIC-T-7244; BR92535) Avail: NTIS HC A02/MF A01

A sulfuric acid anodic film was immersed in solutions of normal aliphatic primary alcohols in carbon tetrachloride in the presence of phosphorus pentoxide. The presence of the alkyl groups (confirmed by IR spectra) results in an increase in the contact angle and consequent improvement in corrosion resistance. The longer the chain, the greater the effect. Author (ESA)

N85-12134# Naval Academy, Annapolis, Md.
SYNTHESIS OF STEREOISOMERIC - METAL COMPLEXES USING PHASE-TRANSFER CATALYSIS AND PHOTOCHEMICAL TRANSFORMS Final Report, 1983 - 1984
D. J. Brown 25 May 1984 78 p
(AD-A145787; USNA-TSPR-128) Avail: NTIS HC A05/MF A01 CSCL 07/3

Cyclopentadienyl carbonyl complexes of iron and ruthenium have been shown to have broad applications in organic synthesis. The viability of these complexes as intermediates is dependent upon convenient and rapid synthetic routes for their preparation. This research has primarily been directed towards the extension of phase-transfer techniques to the preparation of iron and ruthenium allyl and crotyl complexes. In addition, the synthesis of iron and ruthenium olefin complexes by photochemical techniques has been investigated. GRA

N85-12135# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
OBSERVATION OF OXIDE SKIN IN POWDER METALLURGY ALUMINUM ALLOYS Final Report, Dec. 1981 - Dec. 1982
G. Staniek Mar. 1984 51 p
(AF Proj. 2418)
(AD-A145919; AFWAL-TR-83-4157) Avail: NTIS HC A04/MF A01 CSCL 11/6

The present investigation is the first phase of a comprehensive in-house program within the Structural Metals Branch of the Materials Laboratory to study the oxide skin on aluminum powder particles. This phase is concerned with identifying the oxide and determining how the oxide is distributed during processing. Later phases will be directed towards relating the oxide skin distribution to mechanical properties. GRA

N85-12136# National Bureau of Standards, Washington, D.C. Metallurgy Div.
APPLICATION OF SOLIDIFICATION THEORY TO RAPID SOLIDIFICATION PROCESSING SemiAnnual Technical Report, 1 Apr. - 30 Sep. 1983
W. J. Boettinger, J. W. Cahn, S. R. Coriell, J. R. Manning, and R. J. Schaefer Jul. 1984 106 p
(ARPA Order 3751; AF Proj. 4D10)
(AD-A145953) Avail: NTIS HC A06/MF A01 CSCL 07/4

Rapid solidification allows the production of alloys with new compositions and phases and also allows production of improved alloys by control of microstructures and homogeneity. The effect of rapid solidification velocity on the micro-structure of Ag-Cu alloys is comprehensively described, mechanisms of microsegregation-free solidification are reviewed, and microstructure and phase solubility extension in rapidly solidified NiCr-Al quasibinary eutectic alloys are discussed in papers prepared for publication.
Author (GRA)

N85-12137# GTE Labs., Inc., Waltham, Mass.
CRITICAL DYNAMICS FOR CONTINUOUS RAPID SOLIDIFICATION PROCESSING Final Report, Jul. 1983 - Jul. 1984
R. P. I. Adler and S. C. Hsu Aug. 1984 49 p
(Contract N00014-82-C-0434)
(AD-A146071; TR-84-815.1) Avail: NTIS HC A03/MF A01 CSCL 11/6

Quantitative measurements of melt puddle dynamics and the associated characteristics of continuously solidified ribbon products were made as a function of materials combinations and processing conditions. A three-phase approach was taken to separately evaluate the effects of processing parameter variations, of melt chemistry, and of substrate composition. In Phase 1 two processing parameters, the melt delivery rate and the circumferential wheel velocity, were systematically varied for metalloid solute/ nickel-base alloys with Ni-12.8 a/o B-8.3 a/o Si being the primary alloy. In Phase 2, the amount of boron in ternary Ni-metalloid alloys was varied. In Phase 3, attempts to identify alternate substrates other than copper involved the use of Ni-metalloid as well as Ni-Fe-Cr-metalloid alloy melts. GRA

N85-12138# Brown Univ., Providence, R. I. Div. of Engineering.
EFFECTS OF PRIOR AUSTENITE AND FERRITE GRAIN SIZE ON FRACTURE PROPERTIES OF A PLAIN CARBON STEEL
H. Couque, J. Duffy, and R. J. Asaro 1 Jul. 1984 43 p
(Contract DAAG29-81-K-0121)
(AD-A146276; ARO-18414.6-EG) Avail: NTIS HC A03/MF A01 CSCL 11/6

An investigation was conducted into the effects of temperature, loading rate, and various microstructural parameters on the initiation of plane strain fracture of a plain carbon AISI 1020 steel. Ferrite and prior austenite grain sizes were chosen as the principal microstructural features to be investigated. The microstructural variations were accomplished by changing austenitizing temperature and by altering cooling rates during normalization. Fracture toughness tests were conducted using pre-cracked notched round bars loaded in tension at two loading rates. GRA

N85-12139# National Materials Advisory Board, Washington, D.C.
STRUCTURAL USES FOR DUCTILE ORDERED ALLOYS. REPORT OF THE COMMITTEE ON APPLICATION POTENTIAL FOR DUCTILE ORDERED ALLOYS Final Report, 2 May 1983 - 1 Nov. 1984
A. L. Bement, Jr., C. T. Liu, and A. Schaffhauser 31 Aug. 1984 110 p
(Contract MDA903-82-C-0220)
(AD-A146313; NMAB-419) Avail: NTIS HC A06/MF A01 CSCL 11/6

The unique mechanical properties of ordered alloys that make them attractive for structural applications are described. A major difficulty with these alloys has been a lack of ductility; however, in recent years several methods of ductility improvement have been developed. These techniques are discussed. Current research efforts worldwide are reviewed, and it is concluded that the U.S. effort, although substantially smaller than it was 15 years ago, is yielding the most significant progress in the development of ductile ordered alloys. A number of possible generic applications are suggested for the newly developed ductile ordered alloys, including applications in gas turbine engines, rocket propulsion systems, and space power systems. Areas where additional engineering data are required about these alloys are identified and a phased program of data acquisition is recommended. It is emphasized that there is a great need for materials processing information. Areas for scientific research also are identified. Finally, it is concluded that the properties of the newly developed ductile ordered alloys appear to be sufficiently promising to warrant a coordinated program for the application of these alloys to be undertaken. Author (GRA)

N85-12140# Oak Ridge National Lab., Tenn. Solid State Div.
ANNEALING OF IMPLANTED Al-2O-3 IN A REDUCING ENVIRONMENT
G. C. Farlow, C. W. White, C. J. McHarque, and B. R. Appleton Jul. 1984 13 p refs Presented at the Ion Beam Modification of Mater. Conf., Ithaca, N.Y., 16-20 Jul. 1984
(Contract DE-AC05-84OR-21400)
(DE84-015370; CONF-840760-6) Avail: NTIS HC A02/MF A01

Various first row transition metal ions have been implanted into (alpha)-Al2O3 to doses of 4 x 10(16)/cm(2) and depths ranging from 80 to 100 nm. Samples were subsequently annealed in a chemically reducing environment at temperatures ranging from 600 to 1600 C. Each sample was then analyzed for lattice damage, impurity distribution, and impurity incorporation into the lattice by He backscattering-channeling techniques. The channeling spectra of the substrate are found to be nearly the same as for the unimplanted state after annealing at 1500 C. Most of the implanted ions prefer to remain in randomly distributed sites in the lattice and exhibit little or no diffusion after annealing at any temperature in the rage studied. Exceptions are noted and discussed. Angular scans were undertaken to compare the location of implanted Fe in the lattice of samples annealed in an oxidizing environment with those annealed in a reducing environment. DOE

N85-12141# Rolls-Royce Ltd., Derby (England).
THE EFFECT OF ORIENTATION ON FATIGUE GROWTH IN A NICKEL-BASED SINGLE CRYSTAL SUPERALLOY
C. Howland and C. W. Brown 1 Aug. 1984 15 p refs
(PNR-90207) Avail: NTIS HC A02/MF A01

Fatigue crack propagation at room temperature in a precipitation strengthened single crystal nickel-based superalloy was determined using three separate testpiece designs. Fatique crack growth is observed to be exclusively crystallographic, occurring predominantly on 111 planes. Within each testpiece geometry, the measured fatigue crack growth rates are independent of the crystallographic orientation investigated. Good correlation exists between the results from each of the three geometries when compared in terms of the applied stress intensity. For fatigue cracks initiating from a machined notch, early crack growth is controlled by the geometry of the feature. Such growth is very limited and only serves to allow the development of subsequent planar slip.
Author (ESA)

N85-12142# British Petroleum Co. Ltd., Sunbury-on-Thames (England).
THE DEVELOPMENT OF CVD OXIDE COATINGS FOR THE PROTECTION OF METAL SURFACES
J. T. K. Clark, A. I. Foster, M. L. Sims, M. A. M. Swidzinski, and D. Young 1984 12 p refs Presented at 4th European Conf. on CVD, Eindhoven, Netherlands, 31 May - 2 Jun. 1983
Avail: NTIS HC A02/MF A01

Silica and titania chemical vapor desposition coatings developed for the protection of metal substrates are shown to be effective in a range of environments at temperatures between ambient and 1000C. By conducting the coating process at temperatures appropriate to the substrate and the ultimate temperature of usage, highly stable, adherent and impermeable coatings are formed. Silica coatings protect high alloy steels against oxidation and carburization and reduce metal-catalyzed carbon deposition, at temperatures up to 1000C. Titania coatings confer corrosion resistance to mild steel and other substrates when immersed in saline and acid environments. Author (ESA)

N85-12143*# National Bureau of Standards, Washington, D.C.
NBS (NATIONAL BUREAU OF STANDARDS): MATERIALS MEASUREMENTS Annual Report, 1 Apr. 1983 - 31 Mar. 1984

J. R. Manning Jun. 1984 155 p refs
(NASA Order H-27945B)
(NASA-CR-174038; NAS 1.26:174038; PB84-217421;
NBSIR-84-2882) Avail: NTIS HC A08/MF A01 CSCL 11F

Work in support of NASA's Microgravity Science and Applications Program is described. The results of the following three tasks are given in detail: (1) surface tensions and their variations with temperature and impurities; (2) convection during unidirectional solidification; and (3) measurement of high temperature thermophysical properties. Tasks 1 and 2 were directed toward determining how the reduced gravity obtained in space flight can affect convection and solidification processes. Emphasis in task 3 was on development of levitation and containerless processing techniques which can be applied in space flight to provide thermodynamic measurements of reactive materials. R.S.F.

N85-12144# National Bureau of Standards, Washington, D.C. Metallurgy Div.
MECHANICAL PROPERTIES OF A LEADED, RESULFURIZED, REPHOSPHORIZED STEEL IN VARIOUS THERMO/MECHANICAL CONDITIONS Final Report
J. G. Early Jan. 1984 39 p refs Sponsored in part by Coast Guard
(PB84-216464; NBSIR-84-2839) Avail: NTIS HC A03/MF A01 CSCL 11F

The results of the metallurgical evaluation of bar stock samples of AISI 12214 steel in two thermo/mechanical conditions, cold finished and hot rolled, illustrate the dominant role that the thermo/mechanical condition has on the resulting mechanical properties. The contributing effects of ferrite grain size and bar diameter on mechanical properties were small in comparison to the effects of cold work during the cold finishing operation. Cold finished bar stock samples subjected to a thermal brazing cycle (without the brazing alloy) develop mechanical properties that are very similar to those attained in hot rolled bars. GRA

N85-12145# Oklahoma Univ., Norman. School of Chemical Engineering and Materials Science.
RELATED STUDIES TO CATHODIC PROTECTION OF REINFORCED CONCRETE STRUCTURES Final Report
C. E. Locke and C. Dehghanian Jan. 1984 114 p refs Prepared in cooperation with Federal Highway Administration
(PB84-218114; FHWA/RD/OK-83/06) Avail: NTIS HC A06/MF A01 CSCL 11F

A study of making an asphaltic concrete conductive was accomplished using coke breeze mixed with asphalt and aggregate. Mixes containing 45% coke breeze, 7 to 11% asphalt and the remainder a standard aggregate were found to be appropriate for conductive layers for cathodic protection. Testing in the laboratory and bridge decks of molybdenum-molybdenum oxide electrodes indicated these would be useful as embeddable reference electrodes in concrete. Reinforced concrete cylinders were exposed to cathodic protection level currents for five years. Pullout strengths and concentrations of sodium, potassium and chloride ions were determined throughout this time period. GRA

N85-12146# United Kingdom Atomic Energy Authority, Harwell (England). Materials Development Div.
DIFFUSION OF Cr-51 TRACER IN Cr-2O-3 AND THE GROWTH OF Cr-2O-3 FILMS
A. Atkinson and R. I. Taylor Jun. 1984 16 p refs
(AERE-R-11314) Avail: NTIS HC A02/MF A01

The tracer self diffusion coefficient of Cr in-Cr2O3 single crystals was measured at temperatures of 1100 and 1300 C and for oxygen activities ranging from the Cr/Cr2O3 equilibrium to air. The dependence of D*(Cr) on a(O2) is consistent with diffusion by vacancies at high a(O2) and by interstitials at low a(O2). The activation energy of D*(Cr) in the vacancy region at constant a(O2) is 6.0 eV. All the tracer penetration profiles show a strong contribution from diffusion along dislocation, probably in the form of low angle boundaries. The present lattice diffusion coefficients are several orders of magnitude smaller than those of earlier studies which suggests that the earlier measurements were mainly controlled by short-circuit diffusion. The lattice diffusion coefficients are far too low to account for the rate of oxidation of Cr and it is concluded that grain boundary diffusion must be responsible for Cr2O3 film growth. Author

N85-12147# United Kingdom Atomic Energy Authority, Harwell (England). Materials Development Div.
DIFFUSION OF Fe-55 IN Fe-2O-3 SINGLE CRYSTALS
A. Atkinson and R. I. Taylor May 1984 25 p refs
(AERE-R-11286) Avail: NTIS HC A02/MF A01

The diffusion of Fe55 was measured parallel to the c-axis of Fe2O3 single crystals at temperatures in the range 708 C to 1303 C and at an oxygen activity of unity. The tracer penetration profiles were determined using sectioning techniques. For temperatures above 900 C the tracer diffusion coefficient is given by D*(Fe) = 1.6 x 10 to the 9th power exp (-6.0(eV)/kT) sq cm/s and below 900 C by 2.8 x 10 to the -9th power exp (-1.8(eV)/kT). The high temperature behavior is probably characteristic of pure Fe2O3 whereas diffusion at lower temperatures may be influenced by impurities. The most likely defects responsible for diffusion of Fe are iron interstitials and, for oxygen, oxygen vacancies and the observed activation energies are discussed in terms of the properties of these defects. The diffusion data and defect models were used to predict the rate of growth of Fe2O3 and indicate that outward Fe diffusion is the dominenat transport process. Previously published data for Fe2O3 growth in a variety of experimental situations were corrected to a single rate constant using a model for multilayer growth. Author

N85-12148# United Kingdom Atomic Energy Authority, Harwell (England). Metallurgy Div.
SOUR-GAS CRACKING IN FERRITIC STEELS
C. A. Hippsley May 1984 39 p refs
(AERE-R-10908) Avail: NTIS HC A03/MF A01

The problem of sour-gas cracking in a steel gas-production equipment and pipelines is introduced and illustrated by a selection of service failures which have been suffered over the past 30 years. Two fracture mechanisms involved in sour-gas cracking are considered; step-wise cracking - a largely ductile mode generally occurring in lower-strength steels, and sulphide stress cracking - a more brittle mode of fracture usually confined to higher-strength steels. The methods by which material susceptibility to cracking in sour environments may be assessed are summarized. The micromechanism of step-wise cracking and sulphide stress cracking are then described in greater detail and employed, where possible, to rationalize the main conclusions drawn from extensive investigation of environmental and metallurgical influences on sour-gas cracking. The control of sour-gas cracking using current understanding and phenomenology thus obtained is also considered. Author

N85-12149# United Kingdom Atomic Energy Authority, Harwell (England). Metalurgy Div.
THERMAL AGEING STUDIES OF 9%Cr 1%Mo STEEL
M. Wall, B. C. Edwards, and J. A. Hudson Jan. 1984 39 p refs
(AERE-R-11109) Avail: NTIS HC A03/MF A01

The effects of thermal aging on the tensile and impact properties of a commercial 9%Cr 1%Mo steel. In a quenched and tempered condition, were studied. The corresponding grain boundary compositional changes were monitored using transmission electron microscopy. Complementary transmission electron microscopy studies showed significant microstructural changes were occurring during thermal aging and in particular the formation of Laves phase was noted at the lath and grain boundaries. The degradation observed in impact properties was not necessarily reflected in room temperature tensile tests, which were sensitive to grain boundary segregation effects only over a narrow aging regime. This behavior was explained in terms of line scale matrix precipitation followed by particle coarsening. B.G.

N85-12150# United Kingdom Atomic Energy Authority, Harwell (England). Metallurgy Div.
STRESS-DRIVEN SOLUTE ENRICHMENT OF CRACK-TIPS

DURING LOW DUCTILITY INTERGRANULAR FRACTURE OF LOW-ALLOY STEEL

C. A. Hippsley, H. Rauh, and R. Bullough Oct. 1983 52 p refs
(AERE-R-11120) Avail: NTIS HC A04/MF A01

The local distribution of solute chemistry in the vicinity of cracktips has been determined by scanning Auger spectroscopy in specimens of 2 1/2CrlMo steel subject to controlled crack growth by low-ductility intergranular fracture at elevated temperatures. A significant enrichment of sulphur in such regions is shown to be associated with this type of fracture occurring most commonly in low-alloy steels which suffer from stress-relief cracking during post-weld heat treatment. Theoretical analysis of the migration to a crack of dissolved solute atoms, under the influence of the crack-tip stress field, is presented and used to provide a quantitative explanation of the observed sulphur segregation near the crack-tip. The importance of sulphur to the embrittlement process is thus confirmed. Author

N85-12151# United Kingdom Atomic Energy Authority, Harwell (England). Metallurgy Div.

THE EFFECTS OF MICROSTRUCTURE ON THE TEMPER EMBRITTLEMENT SUSCEPTIBILITY OF A Cr-2-1/4 1Mo FORGING

G. Gage, B. C. Edwards, and J. A. Hudson Jan. 1984 27 p refs
(AERE-R-11110) Avail: NTIS HC A03/MF A01

A detailed metallurgical assessment of the microstructural stability and temper embrittlement susceptability of a 255 mm thick 2 1/4Cr 1Mo steel forging which was manufactured by a process typical of that used for the tube plates of steam generator units, was described. Aging effects were studied over the temperature range 450 to 575 C for times up to 20,000h. Grain boundary compositional changes were monitored using Auger Electron Spectroscopy (AES) and microstructural change determined by both transmission electron microscopy and X-ray analysis. Author

N85-12152# United Kingdom Atomic Energy Authority, Harwell (England). Metallurgy Div.

ACOUSTIC EMISSION MONITORING OF FATIGUE IN 7010 ALUMINUM ALLOYS

G. Weatherly, J. M. Titchmarsh, and C. B. Scruby Mar. 1984 43 p refs
(AERE-R-11167) Avail: NTIS HC A03/MF A01

The acoustic emission (AE) was monitored in testpieces of 7010 aluminium alloy containing growing fatigue cracks. Both high purity and commercial casts were studied in underaged, peak and overaged conditions, using tension-tension fatigue with R=0.1 and 0.5, at crack growth rates in the range 0.1 to 3 microns/cycle. The reduction of grip noise and discrimination of AE events with sources distant from the plane of the crack were achieved by careful design of testpiece geometry and clamping, and by the use of two broadband point transducers with calibrated response. Analysis of the load distribution at which AE events occurred at the crack plane showed that most events occurred near peak loading. However, the frequency of detected AE events was sometimes greatly reduced by adding oil to the crack, implying that crack face rubbing was one source of emission. The frequency of events remaining after the removal of rubbing signals was shown to be consistent with the size of the plastic zone at the crack tip, the rate of cack growth and the inclusion size/density distribution. It is estimated that the fracture of inclusions of area greater than 40 sq microns could be detected by the testing system. M.G.

N85-12153# United Kingdom Atomic Energy Authority, Harwell (England). Computer Science and Systems Div.

EXPERT SYSTEMS: THE APPLICATION OF NEW COMPUTER METHODS TO CORROSION PROBLEMS

I. F. Croali, C. Westcott, G. P. Marsh, S. Patel, J. N. Wanklyn, N. J. M. Wilkins, and D. E. Williams May 1984 14 p
(AERE-M-3395) Avail: NTIS HC A02/MF A01

Current developments in information technology, data-base management and knowledge engineering give the possibility of pulling together corrosion expertise and data from many sources into a so-called Expert System for corrosion studies. A general explanation of expert system is presented and how such a system for corrosion prediction and evaluation might be put together is discussed. M.G.

N85-12154# United Kingdom Atomic Energy Authority, Harwell (England). Metallurgy Div.

A STUDY OF PRECIPITATION AND BORON DISTRIBUTION IN 20 Cr 25NI BASE STAINLESS STEELS

C. K. Bullough, J. K. Jenkins, and C. A. English Mar. 1984 27 p refs
(AERE-M-3353) Avail: NTIS HC A03/MF A01

The effect of alloying additions and heat treatment on the microstructural distribution of boron was studied. Eight alloys were investigated, low boron (< 2 wppm) and high boron (containing nominally 300 wppm) versions of a ternary; unstabilized; niobium stabilized and titanium stabilized stainless steels containing 25wt%Cr, 25wt%Ni. These alloys were investigated in the solution treated and in the aged condition by boron autoradiography, optical microscopy, and by transmission electron microscopy techniques. It was found that the distribution of boron within the microstructure could be affected by both alloying addition and heat treatment. The alloys with boron additions had boron segregation to and precipitation at the grain boundaries following solution treatment, whilst those that were boron free generally did not. These observations are related to the kinetics of nonequilibrium boron segregation and to the association of boron with certain precipitate types. The precipitation in aged specimens was also affected by boron: in the unstabilized alloy and stabilized alloys it was heavier. Where M23C6 was precipitated boron caused a marked increase in matrix precipitation. M.G.

N85-12245# Joint Publications Research Service, Arlington, Va.

CRACK RESISTANCE OF PRESSED AND ROLLED SEMIFINISHED GOODS OF ALUMINUM ALLOYS USED IN LOAD-BEARING AIRCRAFT WING STRUCTURES Abstract Only

A. G. Vovnyanko and A. M. Dotsenko *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 1 Transl. into ENGLISH from Fiz.-Khim. Mekhan. Materialov (Kiev), v. 20, no. 2, Mar. - Apr. 1984 p 99-102 Original language doc. previously announced in IAA as A84-35724 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

N85-12246# Joint Publications Research Service, Arlington, Va.

PARAMETERS OF STRUCTURAL RELAXATION AND MECHANICAL PROPERTIES OF AMORPHOUS ALLOYS Abstract Only

A. M. Glezer and O. L. Tevskaya *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 2 Transl. into ENGLISH from Fiz. Metallov i Metalloved. (Sverdlovsk, USSR), v. 57, no. 6, Jun. 1984 p 1198-1210 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

N85-12247# Joint Publications Research Service, Arlington, Va.

EFFECT OF ANNEALING IN TRANSVERSE MAGNETIC FIELD ON MAGNETIC PERMEABILITY OF AMORPHOUS Fe5Co70Si15B10 ALLOY Abstract Only

I. B. Kekalo, A. N. Zhdanov, and V. Yu. Tsvetkov *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 3 Transl. into ENGLISH from Fiz. Metallov i Metalloved. (Sverdlovsk, USSR), v. 57, no. 6, Jun. 1984 p 1213-1215 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

N85-12248# Joint Publications Research Service, Arlington, Va.

MAGNETIC PROPERTIES OF AND SUPERFINE INTERACTIONS IN AMORPHOUS Fe-Cr-Co-Si-B ALLOYS Abstract Only

In its USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 4 Transl. into ENGLISH from Fiz. Metallov i Metalloved. (Sverdlovsk, USSR), v. 57, no. 6, Jun. 1984

p 1094-1100 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

N85-12251# Joint Publications Research Service, Arlington, Va.
STRUCTURAL STABILITY OF NICKEL HEAT RESISTANT ALLOYS AT HIGH TEMPERATURES Abstract Only
N. V. Petrushin, A. V. Logunov, and V. A. Gorin *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 20 Transl. into ENGLISH from Metalloved. i Termicheskaya Obrabotka Metallov (Moscow), no. 5, May 1984 p 36-39 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

N85-12255# Joint Publications Research Service, Arlington, Va.
KINETICS OF FATIGUE FACTOR OF AT3 TITANIUM ALLOYS IN AIR, DISTILLED WATER AND 3.5% AQUEOUS NaCl SOLUTION Abstract Only
L. R. Botvina, S. Ya. Yarema, O. P. Ostash, and I. B. Polutranko *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 24 Transl. into ENGLISH from Fiz.-Khim. Mekhan. Materialov (Kiev), v. 20, no. 2, Mar. - Apr. 1984 p 17-22 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

N85-12256# Joint Publications Research Service, Arlington, Va.
STUDY OF STRUCTURE OF SPONGE TITANIUM VARIETIES Abstract Only
V. A. Likhterman, A. N. Pozdnyakov, R. Ye. Shiryayev, F. B. Khalimov, T. V. Goncharenko, and O. A. Golubeva *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 24-25 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Tsvetnaya Met. (Ordzhonikidze, USSR), no. 2, Mar. - Apr. 1984 p 33-38 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

N85-12257# Joint Publications Research Service, Arlington, Va.
STRUCTURE OF TWO-PHASE TITANIUM ALLOYS WITH DIFFERENT MICROSTRUCTURES
A. S. Fedotov *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 25-26 Transl. into ENGLISH from Metalloved. i Termicheskaya Obrabotka Metallov (Moscow), no. 5, May 1984 p 55-57 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

N85-12258# Joint Publications Research Service, Arlington, Va.
STRUCTURAL RECRYSTALLIZATION IN TITANIUM Abstract Only
D. A. Mirzayev, V. M. Schastlivtsev, M. M. Shteynberg, and V. G. Ulyanov *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 26 Transl. into ENGLISH from Fiz. Metallov i Metalloved. (Sverdlovsk, USSR), v. 58, no. 1, Jul. 1984 p 69-75 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

N85-12259# Joint Publications Research Service, Arlington, Va.
ENERGY OF STACKING FAULT AND DISLOCATION STRUCTURE OF TITANIUM ALLOYS Abstract Only
Yu. N. Petrov, V. L. Svechnikov, and G. N. Nadezhdin *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 27 Transl. into ENGLISH from Fiz. Metallov i Metalloved. (Sverdlovsk, USSR), v. 58, no. 1, Jul. 1984 p 7-80 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

N85-12260# Joint Publications Research Service, Arlington, Va.
STRUCTURE AND PROPERTIES OF TITANIUM ALLOYS AFTER ISOTHERMAL DEFORMATION AT LOW SPEEDS Abstract Only
V. N. Moiseyev, I. A. Povarov, and Yu. I. Kaplin *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 29 Transl. into ENGLISH from Metalloved. i Termicheskaya Obrabotka Metallov (Moscow), no. 5, May 1984 p 43-46 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

N85-12268# Joint Publications Research Service, Arlington, Va.
METALLURGY INSTITUTE'S DEVELOPMENTS FOR ALLOY AND AIRCRAFT PRODUCERS Abstract Only
Tengiz Sigua *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 47 Transl. into ENGLISH from Zarya Vostoka (Tbilisi, USSR), 4 Sep. 1984 p 2 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

N85-12270# Joint Publications Research Service, Arlington, Va.
SUPERPURE MATERIALS RESEARCH PLANNED Abstract Only
In its USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 51 Transl. into ENGLISH from Gudok (Moscow), 18 Aug. 1984 p 4 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

N85-12271# Joint Publications Research Service, Arlington, Va.
IMPROVED REINFORCEMENT METAL Abstract Only
O. Romaniv *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 52-53 Transl. into ENGLISH from Stroitelnaya Gazeta (Moscow), 26 Aug. 1984 p 3 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

N85-12273# Joint Publications Research Service, Arlington, Va.
DEPENDENCE OF MICROPLASTICITY OF BERYLLIUM ON GRAIN SIZE AND HEAT TREATMENT Abstract Only
I. I. Papirov, Ye. S. Karpov, G. F. Tikhinskiy, A. V. Vertkov, and I. G. Ivantsov *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 56 Transl. into ENGLISH from Fiz. Metallov i Metalloved. (Sverdlovsk, USSR), v. 57, no. 6, Jun. 1984 p 1211-1213 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

N85-12738# Bayreuth Univ. (West Germany).
SPUTTERING OF GOLD IRRADIATED WITH THERMAL NEUTRONS [SPUTTERING VON GOLD BEI BESTRAHLUNG MIT THERMISCHEN NEUTRONEN]
J. Kalus, P. Hurych, and J. Selbach *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 540-543 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N85-12155*# National Aeronautics and Space Administration, Washington, D. C.
MICROSTRUCTURE AND PROPERTIES OF CERAMICS
Kenya Hamano Aug. 1984 26 p refs Transl. into ENGLISH from Seramikkusu (Japan), v. 17, no. 8, 1982 p 582-590 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Tokyo Inst. of Technol.
(Contract NASw-3541)
(NASA-TM-77416; NAS 1.15:77416) Avail: NTIS HC A03/MF A01 CSCL 11B

The history of research into the microstructure and properties of ceramic ware is discussed; methods of producing ceramics with particular characteristics are investigated. Bubbles, sintering, cracks, and electron microscopy are discussed. Author

N85-12156*# National Aeronautics and Space Administration, Washington, D. C.

BRITTLENESS OF CERAMICS
Frantisek Kroupa Aug. 1984 46 p refs Transl. into ENGLISH from Cesk. Caspois Pro Fyziku, Sect. A (Czechoslovakia), v. 32, no. 1, 1982 p 1-25 Original language doc. previously announced in IAA as A82-28297 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by State Research Inst. for Materials, Prague
(Contract NASw-3541)
(NASA-TM-77504; NAS 1.15:77504) Avail: NTIS HC A03/MF A01 CSCL 11B

The main characteristics of mechanical properties of ceramics are summarized and the causes of their brittleness, especially the limited mobility of dislocations, are discussed. The possibility of improving the fracture toughness of ceramics and the basic research needs relating to technology, structure and mechanical properties of ceramics are stressed in connection with their possible applications in engineering at high temperature. Author

N85-12157*# National Aeronautics and Space Administration, Washington, D. C.
MICROSTRUCTURE OF CERAMICS FABRICATED BY UNIDIRECTIONAL SOLIDIFICATION
Tadashi Kokubo Aug. 1984 22 p refs Transl. into ENGLISH from Seramikkusu (Japan), v. 18, no. 3, 1983 p 176-183 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Kyoto Univ.
(Contract NASw-3541)
(NASA-TM-77423; NAS 1.15:77423) Avail: NTIS HC A02/MF A01 CSCL 11B

The unidirectional solidification methods are zone melting, crystal pulling, Bridgemen, and slow cooling. In order to obtain excellent properties (such as transparency), pores, voids and cracks must be avoided, and elimination of such defects is described. Author

N85-12158# Materials Research Labs., Melbourne (Australia).
SURFACE COATINGS FOR LOW EMITTANCE IN THE THERMAL SURVEILLANCE BAND
R. L. Calvert, J. A. Gagliardi, and A. D. McLachlan Aug. 1984 32 p refs
(MRL-R-937; AR-003-922) Avail: NTIS HC A03/MF A01

Two types of coatings were investigated; optical quality semiconductor thin films and paint. The semiconductor thin films usually provide much lower emittances than paint and many combinations of different materials were studied in inhomogeneous or graded index metal/dielectric interference films and as single layers of diamond like carbon coatings - low emittance paint is used in solar energy, they are divided into thickness sensitive and thickness insensitive paints. Values of emittance comparable to those for thickness sensitive paints are presented. E.A.K.

N85-12159# Materials Research Labs., Melbourne (Australia).
THE INFLUENCE OF INERT PARTICULATE MATERIAL ON THE PROPERTIES OF RDX/POLYETHYLENE WAX COMPOSITIONS
William S. Wilson May 1984 21 p refs
(MRL-R-929; AR-003-911) Avail: NTIS HC A02/MF A01

Explosive formulations were prepared from RDX, an emulsifiable polyethylene wax and the inert solids graphite, haematite, and silicon carbide. The effects of these solids on the impact sensitivity, shock sensitivity, and velocity of the composition were investigated. Author

N85-12160*# National Aeronautics and Space Administration, Washington, D. C.
CERAMIC POWDER FOR SINTERING MATERIALS
Hideo Akiya and Akiro Saito Mar. 1984 16 p refs Transl. into ENGLISH from Seramikkusu (Japan), v. 18, no. 4, 1983 p 284-288 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Morimura Bros., Inc., Tokyo
(Contract NASw-3541)
(NASA-TM-77434; NAS 1.15:77434) Avail: NTIS HC A02/MF A01 CSCL 11B

Surface activity of ceramic powders such as MgO and Al2O3, for use in sintering with sp. emphasis on their particle size, shape, particle size distribution, packing, and coexisting additives and impurities are reviewed. Author

N85-12161*# National Aeronautics and Space Administration, Washington, D. C.
SINTERING BEHAVIOR OF ULTRAFINE SILICON CARBIDE POWDERS OBTAINED BY VAPOR PHASE REACTION
Yasuzo Okabe, Kenji Miyachi, Junichi Hojo, and Akio Kato Jun. 1984 30 p refs Transl. into ENGLISH from Nippon Kagaku Kaishi (Japan), no. 9, 1981 p 1363-1370 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-77422; NAS 1.15:77422) Avail: NTIS HC A03/MF A01 CSCL 11G

The sintering behavior of ultrafine SiC powder with average particle size of about 0.01-0.06 microns produced by a vapor phase reaction of the Me4Si-H2 system was studied at the temperature range of 1400-2050 deg. It was found that the homogeneous dispersion of C on SiC particles is important to remove the surface oxide layer effectively. B and C and inhibitive effect on SiC grain growth. Author

N85-12162*# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Metallurgy and Materials Science.
ANALYSIS TECHNIQUES FOR TRACER STUDIES OF OXIDATION M. S. Thesis Final Report
Soumendra Nath Basu Nov. 1984 127 p refs
(Grant NAG3-324)
(NASA-CR-174796; NAS 1.26:174796) Avail: NTIS HC A07/MF A01 CSCL 11G

Analysis techniques to obtain quantitative diffusion data from tracer concentration profiles were developed. Mass balance ideas were applied to determine the mechanism of oxide growth and to separate the fraction of inward and outward growth of oxide scales. The process of inward oxygen diffusion with exchange was theoretically modelled and the effect of lattice diffusivity, grain boundary diffusivity and grain size on the tracer concentration profile was studied. The development of the tracer concentration profile in a growing oxide scale was simulated. The double oxidation technique was applied to a FeCrAl-Zr alloy using 0-18 as a tracer. SIMS was used to obtain the tracer concentration profile. The formation of lacey oxide on the alloy was discussed. Careful consideration was given to the quality of data required to obtain quantitative information. Author

N85-12163*# National Aeronautics and Space Administration, Washington, D. C.
THE COLLOIDAL CHEMISTRY OF CERAMIC CLAYS
G. W. Phelps Sep. 1984 29 p refs Transl. into ENGLISH from Ceramica (Sao Paulo), v. 18, no. 69, 1972 p 3-8 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-77734; NAS 1.15:77734) Avail: NTIS HC A03/MF A01 CSCL 11B

The colloidal chemistry and mineralogy of two argil minerals were studied. Deposits of kaolin and of ceramic clays in the United States and England are discussed for the probable mechanism of formation. The structural modifications of the bed, original material associated with the clays and the proper use of flocculants are discussed. E.A.K.

N85-12164# Admiralty Materials Lab., Holton Heath (England). Materials and Life Sciences Dept.
GUIDE TO THE SELECTION OF RUBBERS
B. C. Ochiltree Feb. 1984 41 p
(AMTE(N)-TM-84301; BR91342) Avail: NTIS HC A03/MF A01

Vulcanized rubbers stress-strain properties; dynamic properties; compression set; tension set; creep and stress relaxation; environmental resistance; electrical properties; compatability with explosives; contact with skin and food; gas permeability; and thermal conductivity are discussed. Twenty types of rubber are

described. Design of rubber components is considered.
Author (ESA)

N85-12165# Defence Research Information Centre, Orpington (England).
MECHANOCHEMICAL REACTIONS OF POLYMETHYL METHACRYLATE AND POLYSTYRENE AT HIGH PRESSURE
Y. Ogo, Y. Okuri, and Y. Nakai Jul. 1984 16 p refs Transl. into ENGLISH of Zairyo (Japan), v. 30, no. 336, 1981 p 893-897
(DRIC-T-7307; BR92544) Avail: NTIS HC A02/MF A01

The mechanochemical reactions of polymethyl methacrylate and polystyrene at room temperature up to 15 kbar static pressure were studied using a high pressure apparatus capable of inducing shear deformation. Determinations of molecular weight and shearing stress of sheared samples confirm that mechanochemical reactions proceed markedly in both polymers, and the higher the static pressure the further the reactions proceed. The mechanochemical reaction rate and limiting molecular weight were evaluated by fitting the rate equation to experimental measurements on viscosity and average molecular weight. It is concluded that the mechanochemical reaction mechanism in deformed polymethyl methacrylate is different from that in deformed polystyrene.
Author (ESA)

N85-12166# Ohio State Univ., Columbus. Dept. of Ceramic Engineering.
CERAMIC MICROSTRUCTURE DEVELOPMENT Final Report, 1 Apr. 1980 - 31 Dec. 1982
D. W. Readey Aug. 1984 131 p
(Contract N00014-80-C-0523)
(AD-A145753) Avail: NTIS HC A07/MF A01 CSCL 11/2

This research sought to gain some fundamental understanding about the preparation, consolidation, and sintering of ceramic powder compacts. It covered preparation of powders by vapor phase hydrolysis, molten salt oxidation and decomposition, and controlled precipitation from urea solutions. Consolidation by centrifugal casting was investigated. Nickel oxide powders were prepared by vapor phase hydrolysis of nickel chloride. The process is controlled by nucleation and growth of the powder particles in the gas phase and results in small, about one micrometer, nonagglomerated powders with narrow size distributions. The major part of the research focused on the effect of vapor transport on microstructure development in porous powder compacts. Sintering Fe203 in HCL, and ZnO, CdO, and SnO2 in hydrogen was studied. These systems were chosen because of the high vapor pressures of the product gases which could be achieved. In all cases, sintering was retarded even to the point of zero densification as predicted from sintering models. However, the main microstructural feature produced by enhanced vapor transport is coarsening of the microstructure in general. It was concluded that in most cases, grain boundary motion controlled particle coarsening. GRA

N85-12167# Army Materials and Mechanics Research Center, Watertown, Mass.
INFRARED SPECTROSCOPY STUDY OF THE SP-250 EPOXY RESIN SYSTEM Final Report
R. E. Sacher and B. R. LaLiberte Jul. 1984 34 p
(AD-A145860; AMMRC-TR-84-29) Avail: NTIS HC A03/MF A01 CSCL 07/3

The various epoxides which are part of the SP-250 formulation (3M Company, St. Paul, Minnesota) were treated to three different curing procedures. In this study, the epoxides and the epoxy blends were individually cured with dicyandiamide (Dicy) and Monuron, respectively, and in combination (Dicy/Monuron). The acceleration of the Dicy-containing epoxy resin cure is linked to the formation of cyclic 2-Oxazolidone. The characteristic nature of the carbonyl band of these cyclic derivatives prompted us to monitor the hardening process by infrared spectroscopy. GRA

N85-12168# SKF Industries, Inc., King of Prussia, Pa.
PERFORMANCE EVALUATION OF AUTOMOTIVE WHEEL BEARING GREASES Final Report, 29 Apr. 1983 - 29 Apr. 1984
N. J. Ninos May 1984 80 p
(Contract DAAK70-83-C-0063; DA Proj. 1L7-62733-AH-20)
(AD-A145948; SKF-AT84T004) Avail: NTIS HC A05/MF A01 CSCL 11/8

The lubrication characteristics of five candidate greases for use in non-driven wheel bearings of U.S. Army vehicles have been experimentally evaluated. The lubrication capability of each grease was established in a laboratory environment on a machine designed to simulate the general configuration of an automotive front wheel bearing hub under highly accelerated test conditions designed to precipitate a lubricant related bearing failure. A pair of tapered roller bearings of the size typically used in an automotive application were run at an inner ring speed of 800 rpm, equivalent to 105 kph, and loaded under a continuous radial force equivalent to 150% of the vehicle curb weight and cyclic axial cornering force equal to 30% of the radial force applied for 1-1/2 minutes out of every 5. The ambient environment was also artificially elevated to 394 k (121 C) to further accelerate the test cycle. Each lubricant was rated on the basis of the experimental life achieved, the condition of the residual grease within the bearings and the condition of contact surfaces. The performance of these greases was subsequently compared to that of greases tested in previous programs.
GRA

N85-12169# Naval Weapons Center, China Lake, Calif.
POLYCYCLIC AROMATIC HYDROCARBONS ON THE INNER SURFACES OF COPPER TUBING Final Report, Jul. - Aug. 1982
E. D. Erickson, S. R. Smith, and J. H. Johnson May 1984 32 p
(DA Proj. F65-559)
(AD-A145979; AD-E900344; NWC-TP-6532) Avail: NTIS HC A03/MF A01 CSCL 13/11

Polycyclic aromatic hydrocarbons (PAHs) have been determined by gas chromatography/mass spectrometry to be present on the inner surfaces of copper tubing as the tubing was supplied by the manufacturers. The PAHs probably exist as by-products of the manufacturing process. Concentrations of PAHs as high as 0.17 mg/m of tubing were found. A summary of the various PAHs found in three samples of copper tubing is included with this report. GRA

N85-12170# Delaware Univ., Newark.
MICROSTRUCTURE DEVELOPMENT IN POLYMERS Final Report, 15 Jun. 1981 - 14 Jun. 1984
J. M. Schultz 13 Aug. 1984 11 p
(Contract DAAG29-81-K-0119)
(AD-A145980; ARO-17795.3-MS) Avail: NTIS HC A02/MF A01 CSCL 11/9

The development of microstructure in strained and in relaxed polymer systems has been studied. Results of crystallization of Nylon 6.6 and polyester fibers shows a competition between amorphous relaxation and the growth of fibrillar crystals. A transformation theory for stress-assisted transformation in terms of a defective thermal dendrite model has been proposed. Preliminary SANS work on PET has been successful. Quiescent crystallization studies of TMPS crystallization have been made and have resulted in a transformation-front description of reversible crystallization during cooling. Research on the adhesion of thermal/compression-bonded polypropylene laminates has shown large roles played by relative laminar orientation and prior heat-treatment. Author (GRA)

N85-12171# Army Research and Development Lab., Fort Belvoir, Va.
COOPERATIVE PROGRAM EVALUATION OF NATO MULTI-GRADED DIESEL ENGINE OILS Final Report
T. C. Bowen Mar. 1984 29 p
(AD-A146072; BRDC-2402) Avail: NTIS HC A03/MF A01 CSCL 11/8

The information contained in this report covers the United States portion of a cooperative NATO program investigating the performance characteristics of multigraded engine oil. Seven lubricants (one Grade 10W-30 oil, five Grade 15W-40 products,

and a 20W-40 oil) were evaluated using the diesel engine performance tests required for qualification of MIL-L-2104D engine oils. Two test oils (one Grade 15W-40 product and the Grade 20W-40 oil) met the 1G2 four-cycle diesel performance established for MIL-L-2104D specification. Three products (two Grade 15W-40 lubricants and the Grade 20W-40 oil) demonstrated acceptable 6V53T, two-cycle diesel, performance. However, only the Grade 20W-40 oil showed acceptable performance in both tests. GRA

N85-12172# Naval Research Lab., Washington, D. C.
A SIMPLE ELECTRONIC APPARATUS FOR DETERMINING THE OXIDATION STABILITY OF LUBRICANTS AND OTHER ORGANIC COMPOUNDS Final Report, Oct. 1981 - Oct. 1982
R. N. Bolster and H. Wohltjen 28 Sep. 1984 32 p
(F61-542)
(AD-A146080; NRL-MR-5451) Avail: NTIS HC A03/MF A01 CSCL 11/8

The oxidation breakdown of lubricating oils and other organic compounds is often accompanied by the liberation of vapor phase oxidation products. A simple apparatus which uses a semiconducting tin oxide gas sensor has been employed to monitor the evolution of these products. The method permits complete automation of the oxidation stability testing procedure and an unambiguous indication of the relative oxidation stability of the compounds studied. GRA

N85-12173# Army Materials and Mechanics Research Center, Watertown, Mass.
TIME-TEMPERATURE DEPENDENCE OF THE STRENGTH OF COMMERCIAL ZIRCONIA CERAMICS
L. J. Schioler, G. D. Quinn, and R. N. Katz Apr. 1984 16 p Presented at the DOE Contractors' Meeting, Dearborn, Mich., Nov. 1983
(AD-A146233; AMMRC-TR-84-16) Avail: NTIS HC A02/MF A01 CSCL 11/2

The usual combination of attractive properties exhibited by transformation toughened zirconias (TTZ's) has focused attention on them as leading candidates for application in the adiabatic Diesel engine. These materials are age-hardened ceramic alloy systems and as such they are likely to be susceptible to overaging and loss of strength at long times at high temperatures. This paper presents preliminary data on the microstructural, phase and dimensional stability of aged TTZ's together with some data on the effects of aging on strength, toughness and modulus. Stress rupture data on TTZ's with both MgO and Y2O3 additions show a considerable decrease in load carrying ability at temperatures of 800 C and above. Author (GRA)

N85-12174# Defence Research Establishment Suffield, Ralston (Alberta).
AN INVESTIGATION OF THE SUITABILITY OF USING A SIEGLAFF-MCKELVEY HIGH SHEAR RATE MELT RHEOMETER FOR THE MEASUREMENT OF LOW VISCOSITY POLYMER SOLUTIONS
J. B. Hacker Aug. 1984 38 p
(AD-A146275; DRES-SM-1104) Avail: NTIS HC A03/MF A01 CSCL 07/4

An investigation was made into the adaptation of a Sieglaff-McKelvey high shear rate melt rheometer for use in measuring low viscosity fluids. Using calibrated Newtonian oils, viscosities as low as 1.5 poise were found to be measurable with better than 5% accuracy over a shear rate range from a nominal 1000 1/S to 100,000 1/S at temperatures as low as 5 C above ambient. However, difficulties were experienced in the measurement of low viscosity polymer solutions. With the stock capillaries 25.40 mm in length, a combination of wall slip and entrance/exit effects made calculating true viscosities impossible. It was concluded that capillaries with a diameter of 1.0 mm or greater and variable lengths of up to 50 mm would be required to eliminate slip and still obtain a pressure drop within the measurable range of the instrument. To facilitate accurate measurement of low pressure drops, a new piston design was proposed using low-friction, low leakage Teflon o-rings. This would also expand the lower limits of the instrument's viscosity and shear rate ranges. Author (GRA)

N85-12175# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
HIP GLASSMAKING FOR HIGH NITROGEN COMPOSITIONS IN THE Y-Si-Al-O-N SYSTEM
J. C. Mittl, R. L. Tallman, P. V. Kelsy, Jr., and J. G. Jolley 1984 19 p refs Presented at Effects of Modes of Formation on the Structure of Glass Meeting, Nashville, 9 Jul. 1984
(Contract DE-AC07-76ID-01570)
(DE84-015546; EGG-M-12084; CONF-840768-3) Avail: NTIS HC A02/MF A01

A novel technique for melting high nitrogen glasses in a hot isostatic press is described. Melts were prepared in covered boron nitride crucibles at 1900(0)C and 30 ksi N2. Nitrogen contents, in equivalent percent, ranged from 18% to 62% in increments of 11%. Fusion analyses revealed no losses of nitrogen from these melts. Devitrification and oxidation phenomena were studied by differential thermal analysis and by X-ray diffraction of melt samples quenched from selected temperatures. The glass structure is tightened by the substitution of N for O which increased the fracture toughness of the oxynitride glass. DOE

N85-12176# California Univ., Livermore. Lawrence Livermore Lab.
RE-EVALUATION OF PHASE SEPARATION IN Ti-Zr-Be METALLIC GLASSES
A. R. Pelton and L. E. Tanner 16 Jul. 1984 5 p refs Presented at Intern. Conf. on Rapidly-Quenced Metals, Wurzburg, West Germany, 3 Sep. 1984
(Contracts W-7405-eng-48; W-7405-eng-82)
(DE84-015603; UCRL-91273; CONF-8409107-3) Avail: NTIS HC A02/MF A01

A complete re-examination of the thermal and structural characteristics of Ti-Zr-Be metallic glasses was undertaken in order to investigate the existence of amorphous phase separation. Thermograms from different scanning calorimetry show reproducible multiple glass transitions from the as-quenched ribbons. However, transmission electron microscopy images and diffraction patterns were unable to detect distinct, separated regions. Considering limitations in detection, it is suggested that domains are less than 50 nm in size. DOE

N85-12177# Kabelmetal Electro G.m.b.H., Hannover (West Germany).
OPTIMIZING CONDUCTIVE POLYMER COMPOUNDS Final Report, Dec. 1982
Hermann Uwe Voigt and Ferdinand Hanisch Bonn Bundesministerium fuer Forschung und Technologie Jul. 1984 61 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-84-145; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 13

The composition of extrudable semiconducting compounds was optimized concerning electrical conductivity, behavior during extrusion and mechanical properties. To increase the electrical conductivity of polymer compounds carbon black is added. The best dispersion of carbon black is achieved using a continuously working mixing device and adding the filler after the polymer is in its molten state. Using electrical tests with model cables, a correlation is found between the statistical breakdown values, and the material composition and processing parameters of the semiconducting layer. Author (ESA)

N85-12178# Bayer A.G., Leverkusen (West Germany).
VINYL CITRATES FROM CITRIC ACID AS NEW NONOMERS Final Report, Mar. 1982
Hans-Ferdinand Muisers and Fritz Mietzsch Bonn Bundesministerium fuer Forschung und Technologie Nov. 1983 17 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-83-256; ISSN-0340-7608) Avail: NTIS HC A02/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 4

The synthesis of citric acid vinyl esters and its homo and copolymerization properties were studied. Citric acid trivinyl ester cannot be built up directly with citric acid. Acetyl anhydro citric acid obtained by acetylation of citric acid can be converted to acetyl anhydro citric acid vinyl ester. Unlike vinyl acetate acetyl anhydro citric acid vinyl ester can be copolymerized with styrene. The copolymerization is not strictly alternating, allowing the ratio of the reacting components to be varied. The synthesis of the vinyl ester is relatively complicated, and is not competitive with vinyl acetate or other monomers. Author (ESA)

N85-12179# Texas Technological Univ., Lubbock. Glass Research and Testing Lab.

EVALUATION OF LATERALLY LOADED LAMINATED GLASS UNITS BY THEORY AND EXPERIMENT Final Report

M. P. Linden, J. E. Minor, R. A. Behr, and C. V. G. Vallabham Dec. 1983 140 p refs Sponsored in part by Monsanto Plastics and Resins Co.

(PB84-216423; IDR/DOC-71D) Avail: NTIS HC A07/MF A01 CSCL 11B

Research is undertaken to advance the understanding of the behavior of laminated glass units under lateral pressure representing wind loads. Laminated glass units are comprised of two layers of glass connected by a thin interlayer of polyvinly butyral. The material properties of the interlayer are very different from the properties of the glass plates which join together; its modulus of elasticity in shear is only about 1/100th that of glass. Experimental stress analyses were conducted on several laminated glass units to ascertain whether their behavior was similar to a monolithic glass plate of the same nominal thickness, or to a layered glass unit consisting of two glass plates with no interlayer. At room temperature the laminated glass unit behaves much like a monolithic glass plate of the same nominal thickness. At elevated temperatures (170 f) the behavior changes and approaches that of a layered glass unit with no interlayer. Results of the experimental stress analyses are compared with theoretical stress analysis designed to characterize the behavior of monolithic glass plates and layered glass units. GRA

N85-12180# United Kingdom Atomic Energy Authority, Harwell (England). Materials Devlopment Div.

NEW COATINGS FOR HIGH TEMPERATURE MATERIALS PROTECTION

M. J. Bennett Aug. 1984 25 p refs

(AERE-R-11387; AGR-CWG/P(84)72) Avail: NTIS HC A02/MF A01

The development, characterization and performance evaluation of two new thin (approx < 20 micro m) ceramic coatings for high temperature materials protection is reviewed. These coatings were silica produced by two vapor deposition procedures and ceria formed by sol-gel technology. The current position regarding the use of these coatings in the UK nuclear industry is described. Author

N85-12748# Freiburg Univ. (West Germany).

DESCRIPTION AND CHARACTERIZATION OF DEUTERATED POLYMERS FOR THE ANALYSIS WITH NEUTRON SCATTERING [DARSTELLUNG UND CHARAKTERISIERUNG VON DEUTERIERTEN POLYMEREN ZUR ANALYSE MIT NEUTRONENSTREUUNG]

C. D. Eisenbach, G. Wegner, M. Droescher, M. Peuscher, K. Lee, M. Weiss, and G. Schaechtele *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 687-695 refs In GERMAN (For primary document see N85-12696 03-76)

Avail: NTIS HC A99/MF A01

N85-12750# Ulm Univ. (West Germany).

SMALL ANGLE NEUTRON SCATTERING (SANS) ON POLYMER-OLIGOMER MIXTURES AND ON DEFORMED POLYETHYLENE MELTS [SANS AN POLYMER-OLIGOMER-MISCHUNGEN UND AN DEFORMIERTEN PE-SCHMELZEN]

E. Sautter and W. Pechhold *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 707-715 refs In GERMAN (For primary document see N85-12696 03-76)

Avail: NTIS HC A99/MF A01

N85-12751# Duisburg Univ. (West Germany).

NEUTRON SCATTERING ON POLYSILOXANES [NEUTRONENSTREUUNG AND POLYSILOXANES]

R. Kosfeld, B. Alefeld, H.-H. Grapengeter, M. Hess, U. Leclair, H. Schorn, and J. Weinberg *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 716-726 refs In GERMAN (For primary document see N85-12696 03-76)

Avail: NTIS HC A99/MF A01

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N85-12181# National Aerospace Lab., Tokyo (Japan).

CATALYZED LOW BURNING RATE PROPELLANTS FOR UPPER-STAGE SOLID ROCKET MOTOR

Takashi Niioka, Tohru Mitani, Mamoru Takahashi, Muneo Izumikawa, Kazuo Kishi, and Toshihiro Narata Apr. 1984 23 p refs In JAPANESE; ENGLISH summary

(NAL-TR-805; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

Composite solid propellants catalyzed to lower the burning rate were investigated in this paper. To increase nozzle expansion ratio with a fixed rocket motor length, a smaller nozzle throat, and thus a lower-burning-rate propellant are needed for upper stage motors. A few types of catalysis were selected for experiments in consideration of their propellant flame structure: additives such as oxamide and urea considered for their effect on the solid-phase or decomposition flame of AP, additives such as alkali-metal and halogen compounds for their effect on the diffusion flame of released oxygen and fuel binder, and inert material such as aluminum oxide. Alkali-metal and halogen compounds had no effect on solid propellant, although they are well known as flame suppressants. Urea was the best for decreasing the burning rate, and the specific impulse decrease obtained by the chemical equilibrium calculation was the smallest, but there was a problem with its accommodation to the binder. In the end oxamide turned out to be the best synthetic additive. Utilizing the standard propellant (12%HTPB, 72%AP and 16%Al) and the propellant catalyzed by oxamide, 400 mm diameter spherical motors with aft-end igniter were made and demonstration firing tests were conducted. Author

N85-12182# Committee on Science and Technology (U. S. House).

THE STATUS OF SYNTHETIC FUELS AND COST-SHARED ENERGY R AND D FACILITIES

Washington GPO 1984 408 p Hearings before the Subcomm. on Energy Develop. and Appl. of the Comm. on Sci. and Technol., 98th Congr., 2d Sess., no. 106, 6-7, 13 Jun. 1984

(GPO-36-903) Avail: Subcommittee on Energy Development and Applications

Financial budget for the following issues include: oil shale development; second-generation coal gasification; early experience and generic support to both gasification and direct liquefaction of coal; and supplemental liquids. B.G.

N85-12183*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

LUBRICITY OF WELL-CHARACTERIZED JET AND BROAD-CUT FUELS BY BALL-ON-CYLINDER MACHINE

George M. Prok and Walter S. Kim Nov. 1984 15 p refs
(NASA-TM-83807; E-2308; NAS 1.15:83807) Avail: NTIS HC A02/MF A01 CSCL 21D

A ball-on-cylinder machine (BOCM) was used to measure the lubricity of fuels. The fuels tested were well-characterized fuels available from other programs at the NASA Lewis Research Center plus some in-house mildly hydroprocessed shale fuels from other programs included Jet-A, ERBS fuel, ERBS blends, and blend stock. The BOCM tests were made before and after clay treatment of some of these fuels with both humidified air and dry nitrogen as the preconditioning and cover gas. As expected, clay treatment always reduced fuel lubricity. Using nitrogen preconditioning and cover gas always resulted in a smaller wear scar diameter than when humidified air was used. Also observed was an indication of lower lubricity with lower boiling range fuels and lower aromatic fuels. Gas chromatographic analysis indicted changes in BOCM-stressed fuels. Author

N85-12184# Department of the Air Force, Washington, D.C.
MODULAR DETONATOR DEVICE Patent Application
R. E. Reinovsky, inventor (to Air Force) Filed 20 Jun. 1984 16 p
(AD-D011232; US-Patent-Appl-SN-622613) Avail: NTIS HC A02/MF A01 CSCL 19/1

This patent application discloses a modular detonator devices for use in series array line detonations. The detonator device comprises a case, a coupler and a base. A first electrical contact is disposed on the base and is coupled through an exploding bridgewire and the coupler to the case, where the external wall of the case comprises a second electrical contact of the device. The device may be battery-like in external configuration to facilitate end-to-end placement of the multiplicity of the device in a practically infinite series array, with external wiring necessarily being connected only to the lead and the trailing end of such series array. GRA

N85-12185# Naval Research Lab., Washington, D. C.
COMPOUND CLASS QUANTITATION OF JP-5 JET FUELS BY HIGH PERFORMANCE LIQUID CHROMATOGRAPHY-DIFFERENTIAL REFRACTIVE INDEX DETECTION Memorandum Report, Jun. 1982 - Jun. 1983
C. W. Sink, D. R. Hardy, and R. N. Hazlett 13 Sep. 1984 22 p
(AD-A145754; NRL-MR-5407) Avail: NTIS HC A02/MF A01 CSCL 21/4

Fuel composition effects are known to significantly affect jet turbine engine performance. Currently, one important composition parameter, total aromatics (% v/v), is actually defined in all JP-4 and JP-5 military fuel specifications governing procurement. This report outlines an improved method for defining not only total aromatics but also the two sub-classes, mono-cyclic and di-cyclic aromatics, that make up the total aromatics in JP-5. Special emphasis has been placed on the accurate and precise quantitation of saturates, mono-cyclic and di-cyclic aromatic fractions. This has been accomplished for fuels in the JP-5 distillation range by direct quantitation with a low sensitivity differential refractive index (DRI) detector. The detector is first calibrated by an appropriate standard and the response factors (= weight/area) for each compound class are used by a calculating electronic integrator/recorder to report directly each subsequently analyzed fuel in weight percent for each compound class. The analysis of each fuel is fast and very precise. Accuracy appears to be quite good and is under further investigation. Long term analytical stability has proven (up to one year). Quantitative data for thirteen JP-5 fuels have been compared with data from fluorescence indicator absorption, HPLC/GC (High Performance Liquid Chromatography/Gas Chromatography) and gravimetric data. The thirteen fuels include several experimental jet fuel blends and one shale JP-5 fuel. GRA

N85-12186# Army Armament Research and Development Command, Aberdeen Proving Ground, Md.
THRUST CHARACTERIZATION OF VERY HIGH BURNING RATE PROPELLANTS
I. W. May, F. R. Lynn, A. A. Juhasz, E. Fisher, and P. S. Gough Jul. 1984 61 p
(AD-A145891; AD-F300471; ARBRL-MR-03359) Avail: NTIS HC A04/MF A01 CSCL 19/1

A series of closed bomb combustion tests were conducted on several very high burning rate (VHBR) propellants in which, in addition to the standard pressure measurements, the thrust produced by a burning propellant column was measured using a dynamic force gage located at the end of the propellant column. The results indicate that in several instances the total force imparted to the force gage substantially exceeded that due to the gas pressure alone. The difference is ascribed to the thrust or impulse resulting from very high apparent burning rates. In fact, an analysis of the data for two VHBR propellants indicates that effective burning rates from 100 to 300 m/s are required to produce the observed thrust levels. Such burning rates are not yet explainable by conventional combustion models. Additional physical processes such as convective flamespread or stress-induced surface fracture must be invoked to explain such high apparent burning rates. GRA

N85-12187# Georgia Univ., Athens.
SYNTHESES OF POLYHEDRANES AND POLYHEDRAL CARBORANES Final Report, 15 Jun. 1980 - 30 Jun. 1984
R. B. King 30 Jun. 1984 24 p
(Contract DAAG29-80-K-0030)
(AD-A146076; ARO-17398.4-CH) Avail: NTIS HC A02/MF A01 CSCL 07/3

Polyhedral cage molecules containing the light elements boron or carbon at each of the vertices of the polyhedron are of considerable current interest to the Army as intermediates for the preparation of materials for diverse applications ranging from high energy propellants and explosives to thermally stable polymers. The scientific goal of this research program was the discovery and development of fundamental chemistry relevant to the synthesis of polyhedral cage molecules of importance to the Army. Author (GRA)

N85-12188# Ballistic Research Labs., Aberdeen Proving Ground, Md.
THE IMX DOUBLE DIRECT PROCESS Final Technical Report
L. J. VandeKieft, W. W. Hillstron, and E. J. Pacanowsky Aug. 1984 51 p
(DA Proj. 1L1-61102-AH-43)
(AD-A146250; AD-F300474; ARBRL-TR-02572) Avail: NTIS HC A04/MF A01 CSCL 19/1

The purpose of this work is to develop a new explosive based on eutectic blends of ammonium nitrate with ethylenediamine dinitrate and its homologues and to assess the safety and performance characteristics of these formulations. Various processes for making these formulations were attempted and will be described. Mixes have been scaled from several grams to 30 kilograms. Additives were introduced for stabilization, energy enhancement and sensitization. The neat eutectic is very insensitive so various additives were used to ensure detonation. A historic problem has been that of phase stabilization; a recently discovered solution to this problem, incorporation of 15-wt-% potassium nitrate with the ammonium nitrate, was used in this study. Normally, stabilizing ammonium nitrate with potassium nitrate requires working with the molten materials at elevated temperatures and processing them into prills. A unique feature of the process described in this report is that stabilization is accomplished in the melt kettle, with all other required ingredients and at much lower temperature. Formulations were evaluated from the standpoint of processing, performance, and sensitiveness. These materials appear to have great potential as military explosives because of their good performance, low cost, safety, ease of processing, and compatibility with current Army melt-cast ammunition loading plants. The double direct process, developed here, was found to yield an explosive with less sensitiveness and less impurities than that produced by other processes. GRA

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N85-12189 Wisconsin Univ., Milwaukee.
KINEMATIC SYNTHESIS OF PLANAR CAM-LINK MECHANISMS FOR EXACT PATH AND EXACT MOTION GENERATION Ph.D. Thesis
Yesh Pal Singh 1984 227 p
Avail: Univ. Microfilms Order No. DA8418244

The development of mathematical tools for number and dimensional synthesis of planar cam-link mechanisms having single degree of freedom is described. For number synthesis, a semi-mathematical method, utilizing Franke's condensed molecule technique and structural analysis equations, was developed. This method was used for enumeration of planar cam-link chains containing one and two cam pairs. A large number of mechanisms were deduced from these kinematic chains. For dimensional synthesis, two types of mathematical methods were developed. One is purely analytical and yields the information required in synthesis, in closed form. This method of synthesis is applied for the design of several types of cam-link mechanisms for generation of exact path and exact motion specifications. It is then shown that for more complex design specifications and also if the number of links in a mechanism is larger than 4, this method will become progressively more algebraically involved. For such cases, a generalized computational synthesis procedure is developed.
Dissert. Abstr.

N85-12190# Joint Publications Research Service, Arlington, Va.
WEST EUROPE REPORT: SCIENCE AND TECHNOLOGY, NO. 166
30 Nov. 1983 76 p Transl. into ENGLISH from various West European articles
(JPRS-84845) Avail: NTIS HC A05/MF A01

Several areas of science and technology are addressed including computers, microelectronics, scientific and industrial policies, metallurgy, biotechnology, aerospace, and factory automation. For individual titles, see N85-12191 through N85-12194.

N85-12191# Joint Publications Research Service, Arlington, Va.
FRENCH, SOVIETS DECIDE TO LAUNCH SIGMA SPACE TELESCOPE c89
In its West Europe Rept.: Sci. and Technol., No. 166 (JPRS-84845) 30 Nov. 1983 p 3-5 Transl. into ENGLISH from AFP Sci. (Paris), 6 Oct. 1983 p 11-12 (For primary document see N85-12190 03-31)
Avail: NTIS HC A05/MF A01

France and the U.S.S.R. are cooperating in a gamma-radiation astronomy project called Sigma (gamma imaging system resolution with aleatory masking). The mission of Sigma is to map the heavens in the soft gamma range and in the hard X-ray range. B.G.

N85-12192# Joint Publications Research Service, Arlington, Va.
FRENCH FIRMS DEVELOP ARTIFICIAL INTELLIGENCE ROBOT c37
In its West Europe Rept.: Sci. and Technol., No. 166 (JPRS-84845) 30 Nov. 1983 p 16 Transl. into ENGLISH from Electron. Actualites (Paris), 21 Oct. 1983 p 22 (For primary document see N85-12190 03-31)
Avail: NTIS HC A05/MF A01

COMEX is currently experimenting with a remote-controlled robot whose electronics were developed by Matra. This robot will eventually be fitted with a manipulator arm and thus become the first lightweight vehicle capable of directly performing underwater tasks. Equipment designed to prepare the ends of underwater pipelines for welding was developed. The major problem lies in the final phase. COMEX has developed a shape-recognition device capable of receiving an image of the sections to be welded. The robot will interpret that image and guide the welding torch accordingly. This is a second-generation robot capable of self-adaptation but whose development is plagued with unknowns. A small-sized vehicle capable of observing, when completely untethered, and of maneuvering at a depth of more than 1,000 meters within cluttered and congested areas, indeed even inside submerged tructures was designed. Designated ELIT, this vehicle would be remotely controlled via an acoustic channel and be equipped with artificial intelligence. B.G.

N85-12193# Joint Publications Research Service, Arlington, Va.
SWISS FIRM IMPROVES METHOD FOR SOLDERING PRINTED CIRCUITS c33
J. P. Feste *In its* West Europe Rept.: Sci. and Technol., No. 166 (JPRS-84845) 30 Nov. 1983 p 30-31 Transl. into ENGLISH from Electron. Actualites (Paris), 7 Oct. 1983 p 1; 17 (For primary document see N85-12190 03-31)
Avail: NTIS HC A05/MF A01

Multilayer printed circuits with four to six layers are replaced by one double-face circuit with metallized holes of equivalent density. The Swiss company ERCI represented by Sifrem has just set up for fabrication of printed circuits having 200-microns-wide tracks four of which fit between the pins of the DIL case. Author

N85-12194# Joint Publications Research Service, Arlington, Va.
INTEGRATED CIRCUITS, MBM'S, FORM FOCUS OF WORK AT FRENCH LETI c33
In its West Europe Rept.: Sci. and Technol., No. 166 (JPRS-84845) 30 Nov. 1983 p 33-35 Transl. into ENGLISH from Electron. Actualites (Paris), 7 Oct. 1983 p 10 (For primary document see N85-12190 03-31)
Avail: NTIS HC A05/MF A01

In the integrated circuits (IC) area, the programs are aimed at: basic techniques and machines; silicon IC; Josephson devices and IC; magnetic bubble memories (MBM); and infrared imaging IC. In I/O (input/output) components, the research is primarily concerned with: basic techniques; displays and flat screens; and guided optics. Author

N85-12195# Joint Publications Research Service, Arlington, Va.
EAST EUROPE REPORT: SCIENTIFIC AFFAIRS, NO. 791
26 Oct. 1983 130 p refs Transl. into ENGLISH from various East European articles
(JPRS-84624) Avail: NTIS HC A07/MF A01

The development and market trends of products which use large scale integrated circuits are discussed. Various aspects and applications of artificial intelligence are considered. Developments in optical sensors for use on industrial robots are examined. Bibliographies of Polish Academy of Science members are given. The development of airborne remote sensing techniques and hardware design is reviewed. For individual titles, see N85-12196 through N85-12199.

N85-12196# Joint Publications Research Service, Arlington, Va.
PROBLEMS IN CEMA MICROELECTRONIC COOPERATION NOTED c33
Jan Grzybowski and Jerzy Kusinski *In its* East Europe Rept.: Sci. Affairs, No. 791 (JPRS-84624) 26 Oct. 1983 p 1-10 Transl. into ENGLISH from Hiradastech. (Budapest), no. 4, 1983 p 160-164 (For primary document see N85-12195 03-31)
Avail: NTIS HC A07/MF A01

The development and market trends of products, which use large scale integrated circuits are discussed. Products such as pocket calculators, electronic wrist watches, telephones, and automobiles are used to illustrate the economic results of market saturation with specialized integrated circuits. The status of microelectronics in socialist countries in Europe is addressed.
R.S.F.

N85-12197# Joint Publications Research Service, Arlington, Va.
TECHNOLOGICAL INSTITUTE DIRECTOR VIEWS ARTIFICIAL INTELLIGENCE c63
In its East Europe Rept.: Sci. Affairs, No. 791 (JPRS-84624) 26 Oct. 1983 p 12-17 Transl. into ENGLISH from Prace (Prague), 16 Jul. 1983 p 4 (For primary document see N85-12195 03-31)
Avail: NTIS HC A07/MF A01

Various aspects and applications of artificial intelligence are considered. Direct human voice communication with computers is discussed along with programming languages, chips, theorem proving, industrial robots, and fifth generation computers. R.S.F.

N85-12198# Joint Publications Research Service, Arlington, Va.
SENSOR TECHNOLOGY FOR SECOND, THIRD GENERATION INDUSTRIAL ROBOTS. OPTICAL SENSOR APPLICATIONS c37
Dietmar Otto *In its* East Europe Rept.: Sci. Affairs, No. 791 (JPRS-84624) 26 Oct. 1983 p 18-21 refs Transl. into ENGLISH from Urania (Leipzig), v. 33, no. 8, Aug. 1983 p 12-16 (For primary document see N85-12195 03-31)
Avail: NTIS HC A07/MF A01

Developments in proximity and optical sensors for use on industrial robots are examined. Emphasis is placed on the industrial applications of the instruments as well as a brief assessment of the individual device technologies involved. M.A.C.

N85-12199# Joint Publications Research Service, Arlington, Va.
SATELLITE, AIRBORNE REMOTE SENSING DEVELOPMENT OUTLINED c43
Bogdan Ney *In its* East Europe Rept.: Sci. Affairs, No. 791 (JPRS-84624) 26 Oct. 1983 p 118-127 Transl. into ENGLISH from Nauka Polska (Warsaw), no. 1-2, Jan. - Feb. 1983 p 87-95 (For primary document see N85-12195 03-31)
Avail: NTIS HC A07/MF A01

The development of airborne remote sensing techniques and hardware design is examined. Emphasis is placed on data acquisition and processing as well as satellite remote sensing and earth resource exploration. M.A.C.

N85-12200*# Astro Research Corp., Carpinteria, Calif.
LARGE-DIAMETER ASTROMAST DEVELOPMENT Final Report
Laurence A. Finley 19 Jul. 1984 43 p
(Contract NAS8-34547)
(NASA-CR-171201; NAS 1.26:171201; ARC-TN-1132) Avail: NTIS HC A03/MF A01 CSCL 13B

The 15-m-long by 0.75-diameter deployable supermast was delivered. The performance characteristics, design parameters, and developmental work associated with this mast are described. The main differences, besides the length of these two mast sections, are a change in the longeron material (the principal structural member) to a circular cross section and the incorporation of a lanyard-bridle system which makes unaided deployment and retraction possible in zero gravity. B.G.

N85-12201# Hell (Rudolph), Kiel (West Germany). Entwicklungsbereich Drukformherstellung.
FAST AND PRECISE PROCESSING OF MATERIAL BY MEANS OF AN INTENSIVE ELECTRON BEAM Final Report, Dec. 1982
Siegfried Beisswenger Bonn Bundesministerium fuer Forschung und Technologie Jul. 1984 85 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-84-123; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 18

For engraving a picture carrying screen of cells into the copper-surface of gravure cylinders, an electron beam system was developed. Numerical computations of the power density in the image planes of the electron beam determined the design of the electron optical assembly. A highly stable electron beam of high power density is generated by a ribbon-like cathode. A system of magnetic lenses is used for fast control of the engraving processes and for dynamic changing of the electron optical demagnification. The electron beam engraving system is capable of engraving up to 150,000 gravure cells per sec. Author (ESA)

N85-12202# Cambridge Univ. (England). Dept. of Engineering.
[ACTIVITIES REPORT OF THE DEPARTMENT OF ENGINEERING] Annual Report, 1982/83
1983 34 p refs
Avail: NTIS HC A03/MF A01

Acoustics, aerodynamics, fluid mechanics, design, electrical, materials science, mechanical, control, robotics, soil mechanics, structural engineering, thermodynamics, and turbomachine engineering research are described. Author (ESA)

N85-12203# California State Dept. of Transportation, Sacramento. Office of Transportation Lab.
EXPERIMENTAL AC (ASPHALT CONCRETE) OVERLAYS OF PCC PAVEMENT Interim Report
R. D. Smith Nov. 1983 67 p refs Sponsored by Federal Highway Administration
(PB84-218171; TL-633352; FHWA/CA/TL-83/07) Avail: NTIS HC A04/MF A01 CSCL 13B

A series of experimental asphalt concrete (AC) overlays was constructed over an existing distressed portland cement concrete pavement on Interstate 80 near Boca, California. The experimental overlays included rubberized dense-graded AC, rubberized open-graded AC, a rubber flush coat interlayer, dense-graded AC with short polyester fibers and Bituthene interlayer strips. The report presents a description and discussion of AC mix batching, construction observations, laboratory testing, overlay covering, and initial performance evaluation. GRA

N85-12204# Purdue Univ., Lafayette, Ind.
DEVELOPMENT OF A RAPID TEST METHOD FOR ASPHALT CONCRETE CONTENT DETERMINATION IN HOT-MIX PAVING MIXTURES Final Report
J. J. M. Chavez 10 Jan. 1984 101 p refs Sponsored by Federal Highway Administration
(PB84-218692; JHRP-84/3; FHWA/IN/JHRP-84/3) Avail: NTIS HC A06/MF A01 CSCL 13B

A rapid test method was developed for the determination of asphalt cement content in hot-mix bituminous paving mixtures. It is based on the extraction of asphalt cement from mixtures with trichloroethylene and subsequent measurement of the transmittance of light through the extracted solution. A good correlation was found between the results obtained using the rapid test and those obtained using the standard test (ASTM D-2172, Method E1) for samples tested in the field at asphalt mix plants. The test uses a portable spectrophotometer and a metal can for extraction. The asphalt content can be determined in less than ten minutes. The possibility of using the rapid test on materials containing emulsified asphalt, slag aggregate, unusually high amounts of fine material and recycled material was also studied. GRA

N85-12205# Texas Univ., Austin. Center for Transportation Research.
EVALUATION OF MODULI AND THICKNESSES OF PAVEMENT SYSTEMS BY SPECTRAL-ANALYSIS-OF-SURFACE-WAVES METHOD Interim Research Report
S. Nazarian and K. H. Stokoe Dec. 1983 124 p refs Sponsored by Federal Highway Administration
(PB84-219112; CTR-3-8-80-256-4; FHWA/TX-83/26-256-4) Avail: NTIS HC A06/MF A01 CSCL 13B

The spectral-analysis-of-surface-waves (SASW) method is nondestructive method for evaluating the moduli and thicknesses of pavement systems. By means of a transient impact applied to the surface of a pavement system or soil deposit, a group of waves with different frequency components is transmitted to the medium. By analysis of the phase information for each frequency determined between two receivers located on the surface, Rayleigh wave velocity, shear wave velocity, and eventually elastic moduli and thicknesses of the various layers in the pavement system are determined. The method has the advantages of being: (1) fast and economical, (2) nondestructive, and (3) capable of full automation. Three series of tests were performed on State Highway 71 near Columbus, Texas. These tests were performed on a continuously reinforced concrete pavement, an asphaltic-concrete shoulder, and a soil median. GRA

N85-12206# Southwestern Public Service Co., Amarillo, Tex.
FABRIC FILTER SYSTEM STUDY Annual Report, Oct. 1980 - Jun. 1984
R. L. Chambers, O. C. Plunk, and S. L. Kunka Aug. 1984 68 p refs
(Contract EPA-68-02-2659)
(PB84-229749; EPA-600/7-84-003; AR-4) Avail: NTIS HC A04/MF A01 CSCL 13B

Results of the fourth year of operation of a fabric filter installed on a coal-fired boiler are reported. Project work during the fourth year concentrated on fabric studies. The 10-oz/sq yd fabrics of the 150 1/2 warp, 150 2/2T fill construction demonstrated superior performance over the most common 14-oz/sq yd constructions, regardless of coating. It was determined that improving cleaning by increasing shaking amplitude is more detrimental to baglife than increasing shaker frequency. Maintenance and operation observations continued, and the resolution of these types of problems became more efficient because of increased experience of maintenance personnel with baghouse-related problems. GRA

N85-12207# Research Triangle Inst., Research Triangle Park, N.C.
ELECTROSTATIC AUGMENTATION OF FABRIC FILTRATION: REVERSE-AIR PILOT UNIT EXPERIENCE Final Report, Jun. 1982 - Sep. 1983
D. W. VanOsdell and D. A. Furlong (ETS, Inc., Roanoke, Va.) Aug. 1984 130 p refs
(Contract EPA-68-02-3186)
(PB84-230002; R-47U-1915; EPA-600/7-84-085) Avail: NTIS HC A07/MF A01 CSCL 13B

The use of a pilot unit (consisting of two baghouses in a parallel-flow arrangement on a slipstream from an industrial pulverized-coal boiler house) to test electrostatically augmented fabric filtration (ESFF) in a reverse-air cleaning model is described. The method is characterized by electrodes arranged about 2 cm apart around the circumference of the bag and running the length of the bag. An electric field of 2-4 kV/cm is maintained between the electrodes and perpendicular to the gas flow. Results showed that ESFF can reduce fabric filter pressure drops and may allow reverse-air filtration at a 2 cm/s face velocity, rather than the conventional 1 cm/s. A filter bag with stainless steel electrodes woven into the fabric was developed for the reverse-air tests as part of this research. The woven-in electrode and the potential for doubling the face velocity appear to make ESFF economically attractive for commercial baghouse users. GRA

N85-12208# National Bureau of Standards, Washington, D.C. Center for Fire Research.
FIRE RESEARCH PUBLICATIONS, 1983
N. H. Jason Apr. 1984 20 p refs
(PB84-217066; NBSIR-84-2871) Avail: NTIS HC A02/MF A01 CSCL 13L

Approximately 130 articles are cited addressing topics in fire fighting and prevention, combustion physics, and fire related hazards. Only publications prepared by members of the Center for Fire Research (CFR), by other National Bureau of Standards (NBS) personnel for CFR, or by external laboratories under contract or grant from the CFR are cited. For documents that are available for purchase from either the Government Printing Office (GPO) or the National Technical Information Service (NTIS), the specific order number has been included in the citation. M.G.

N85-12209# National Bureau of Standards, Washington, D.C. Center for Building Technology.
TEST METHODS AND STANDARDS DEVELOPMENT FOR ACTIVE SOLAR HEATING AND COOLING SYSTEMS Final Report
H. R. Trechsel and B. L. Collins Apr. 1984 145 p refs
(Contract DE-AI01-76PR-06010)
(PB84-217447; NBSIR-84-2845) Avail: NTIS HC A07/MF A01 CSCL 13A

Since test methods and standards for active solar heating and cooling systems did not exist in 1976, the Department of Energy sponsored research at the National Bureau of Standards (NBS) and other laboratories to aid in the development of research-based standards. This research was intended to facilitate a sound data base for the development of national consensus standards and test methods. Research by NBS and other laboratories is described for solar domestic hot water systems, solar collectors, thermal storage devices and collector materials. For collectors, research and test methods are described for determining the performance of cover plates, absorber materials, collector insulation, gaskets and sealants, rubber hose, containment materials, and heat transfer fluids. GRA

N85-12210# Joint Publications Research Service, Arlington, Va.
EAST EUROPE REPORT: SCIENCE AND TECHNOLOGY
25 Oct. 1984 61 p ref Transl. into ENGLISH from various East European articles
(JPRS-ESA-84-038) Avail: NTIS HC A04/MF A01

Scientific development in several East European countries is discussed. Specific topis include: industrial robots, remote sensing, biology, microelectronics, fiber optics, and biochemistry. For individual titles, see N85-12211 through N85-12214.

N85-12211# Joint Publications Research Service, Arlington, Va.
DEVELOPMENT, PRODUCTION, APPLICATION OF ROBOTS ASSESSED c37
Tadeusz Jaworski *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-038) 25 Oct. 1984 p 1-3 Transl. into ENGLISH from Trybuna Ludu (Warsaw), 15-16 Sep. 1984 p 3 (For primary document see N85-12210 03-31)
Avail: NTIS HC A04/MF A01

The use of robots in industrial settings in Poland is addressed. The level of industrial robotics in Poland is contrasted with other countries belonging to the Council for Economic Mutual A10. Reasons for increasing industrial automation in Poland are given. R.S.F.

N85-12212# Joint Publications Research Service, Arlington, Va.
ACHIEVEMENTS IN DEVELOPMENT OF SPACE METEOROLOGY c47
V. Zakhariev *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-038) 25 Oct. 1984 p 7-13 ref Transl. into ENGLISH from Spisanie na Bulgar. Akad. na Naukite (Sofia), no. 3, 1984 p 16-21 (For primary document see N85-12210 03-31)
Avail: NTIS HC A04/MF A01

Remote sensing of various atmospheric parameters by Bulgarian scientists is reviewed. Specific research activities mentioned include: morphological classification of cloud vortices, vertical probing of temperature in the atmosphere, analysis of the geopotential field in the stratosphere, and the development of radar wind measurement equipment. R.S.F.

N85-12213# Joint Publications Research Service, Arlington, Va.
ACHIEVEMENTS IN BIOLOGY OUTLINED c51
Georgi Petkov *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-038) 25 Oct. 1984 p 14-15 Transl. into ENGLISH from Vecherni Novini (Sofia), 18 Aug. 1984 p 4 (For primary document see N85-12210 03-31)
Avail: NTIS HC A04/MF A01

Bulgarian advances in biological science are reviewed briefly. Developments in genetics, cryogenics, agrobiology, and scientific instrumentation are cited. R.S.F.

N85-12214# Joint Publications Research Service, Arlington, Va.
FIBER OPTICS DEVELOPMENT, PROSPECTS ASSESSED c74
Bogdan Marks *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-038) 25 Oct. 1984 p 25-32 Transl. into ENGLISH from Przeglad Tech. (Warsaw), no. 29, 15 Jul. 1984 p 14-15 (For primary document see N85-12210 03-31)
Avail: NTIS HC A04/MF A01

The status of fiber optics technology in Poland is discussed. Application of fiber optics to telecommunication and military radar

is mentioned. Internal problems slowing the development of Polish fiber optics technology are addressed. R.S.F.

N85-12215# Joint Publications Research Service, Arlington, Va.
USSR REPORT: ELECTRONICS AND ELECTRICAL ENGINEERING Abstracts Only
15 Oct. 1984 68 p Transl. into ENGLISH from various Russian articles
(JPRS-UEE-84-014) Avail: NTIS HC A04/MF A01

News items, abstracts, and articles of scientific reports on aspects of electronics and electrical engineering including antennas; circuits and systems; computers; electromagnetic compatibility; industrial electronics and control instrumentation; magnetics; microwave theory and techniques; power engineering; quantum electronics/electro-optics; solid state circuits; and sonics and ultrasonics are contained. For individual titles, see N85-12216 through N85-12243.

N85-12216# Joint Publications Research Service, Arlington, Va.
MEASUREMENT OF SNOW COVER THICKNESS BY RADAR SOUNDING Abstract Only **c32**
V. V. Bogorodskiy and V. I. Poznyak *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 1 Transl. into ENGLISH from Z. Tek. Fiz. (Leningrad), v. 54, no. 5, May 1984 p 998-1000 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

A new radar method for investigating snow cover developed at the Arctic and Antarctic Scientific Research Institute is described and shown to be effective for measuring the ground snow cover thickness at mid-latitudes, which varies from several centimeters to a meter or more. A pulsed radar instrument emitting at a center frequency of 10 GHz and producing peak pulse power of 3 watts is described. The radio wave propagation velocity in snow is determined from measurements of the snow density and temperature along the radar sounding routes. The method and equipment can be used to measure snow thickness on various underlying surfaces and to measure the thickness of ice on fresh water.
Author

N85-12217# Joint Publications Research Service, Arlington, Va.
DIFFRACTION OF PLANE ELECTROMAGNETIC WAVES ON SEMIINFINITE GRID OF PARALLEL CONDUCTORS ARRANGED AT ANGLE TO ITS EDGE Abstract Only **c32**
V. A. Rozov and S. A. Tretyakov *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 1-2 Transl. into ENGLISH from Radiotek. i Elektron. (Moscow), v. 29, no. 5, May 1984 p 856-865 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

The problem of diffraction on a semiinfinite grid comprised of parallel conductors set at an arbitrary angle to the grid edge with an oblique incident plane wave is examined. The scattered field is found to represent the superposition of geometric optical, edge and surface waves. No surface wave occurs when the conductors are parallel to the edge of the grid, or when the angle between the x axis and the direction to the source is the same as the angle between zeta(sub 0) and = x0. When the wave is normally incident with respect to the edge of the grid, no surface wave occurs when the conductors are parallel or perpendicular to the edge. The solution obtained by the Kirchoff approximation method contains no surface wave, and the edge wave depends differently upon the parameters of the grid and the coordinates of the observation point than for the more rigorous solution. Author

N85-12218# Joint Publications Research Service, Arlington, Va.
RULES FOR POST-DETECTOR DETECTION OF WEAK SIGNALS IN NON-GAUSSIAN NOISE OF UNKNOWN POWER Abstract Only **c32**
Ya. Yu. Nikitin and R. P. Filimonov *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 2 Transl. into ENGLSH from Radiotek. i Electron. (Moscow), v. 29, no. 5, May 1984 p 914-919 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

A general method is presented for constructing post-detector rules for detecting weak signals whose envelope is characterized by a non-Gaussian distribution function. Locally most powerful ranking detection rules, as well as parametric noise-invariant detection rules, are derived. The explicit form of the corresponding characteristics is obtained for examples of noise for which the envelope is described by a Nakagami or Weibull distribution. Comparison of the structure of the ranking and invariant statistics indicates that the ranking statistics are simpler. The results are based on a formula derived for the local representation for the density of the envelope of the signal noise mixture. Author

N85-12219# Joint Publications Research Service, Arlington, Va.
MINIMIZATION OF ANOMALOUS ERRORS IN MEASURING SYSTEMS EMPLOYING SEARCH AND TESTING DEVICES Abstract Only **c35**
V. M. Katikov *In its* USSR Rept.: Electron. and Elec. (JPRS-UEE-84-014) 15 Oct. 1984 p 2-3 refs Transl. into ENGLISH from Radiotek. i Electron., v. 29, no. 5, May 1984 p 920-927 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

The analytical method presented eliminates the arbitrariness involved in defining the requirements for the characteristics of detectors in measuring systems based on intuitive conceptions, and defines the requirements on the basis of the observer's attitude to anomalous phenomena in the measurement process. A theorem is derived and proved which simplifies the computational procedure involved in the numerical solution of parametric optimization problems for specific measuring systems incorporating digital signal processors in which the internal parameters can be autonomously optimized. Author

N85-12220# Joint Publications Research Service, Arlington, Va.
POSSIBILITY OF REALIZATION OF HIGHLY-DIRECTIONAL ANTENNA ARRAYS Abstract Only **c32**
V. A. Pavlyuk, T. A. Sigova, M. A. Martynov, and V. P. Kismereshkin *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 3 Transl. into ENGLISH from Radiotek. i Electron. (Moscow), v. 29, no. 5 p 990-991 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

The results are reported of experiments conducted in a chamber with a coefficient of reflection of -20 kb at 1 GHz on axial linear equidistant arrays of 2, 3 and 4 elements with maximum directional gain. Allowance is made for a priori information by determining the mutual influence of the radiators and errors in the tuning of the array. A mathematical model is developed which can be used to determine the potential capabilities of highly directional systems. It is shown analytically that maximum directional gain for a linear equidistant array of isotropic elements spaced d=0.5 lambda apart can be achieved in a highly directional array with dimensions reduced by factors of approximately 10 to 50 while varying the value of gamma from 10(-1) to 10(-4). The analytical and experimental data provide evidence that miniature antenna systems with enhanced frequency selectivity and directivity can be developed. Author

N85-12221# Joint Publications Research Service, Arlington, Va.
SCATTERING OF RADIO WAVES ON MAGNITIZED METEOR TRAIL Abstract Only **c32**
V. V. Sidorov and R. G. Khuzyashev *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 5 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved. Radiofiz. (Gorky, USSR), v. 27, no. 5, May 1984 p 661-664 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

A nonmutual meteor radio channel is modeled by scattering of normally incident radio waves on an infinite axially magnetized plasma cylinder. The diffraction problem is solved over a wide interval of magnetic field values. Analysis of the behavior of three values of the linear electron density reveals that the difference between the direct and return wave depends upon the volumetric

electron density. When the volumetric electron density is high, i.e., when the radii of the trail are small and the electromagnetic field penetrates little into the plasma cylinder, the latter is approximated by a metal cylinder and there is little difference between the outgoing and return signal. As the meteor trail expands and the amplitude of the reflecting signal increases, the volumetric electron density becomes smaller, the field penetrates deeper into the plasma and the influence of anisotropy of the meteor trail on the characteristics of the outgoing and return wave becomes stronger. According to the model, the best method to reduce nonmutuality is to use high working frequencies in order to reduce the gyro frequency of the magnetic resonance. Author

N85-12222# Joint Publications Research Service, Arlington, Va.
INDUSTRIAL ROBOTS AND TRANSMANIPULATIONS: IMPORTANT LINK IN SETUP OF AUTOMATED PRODUCTION LINES Abstract Only c37
Yu. N. Zhukov and S. D. Smirnov *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 14 Transl. into ENGLISH from Electrotek. (Moscow), no. 4, Apr. 1984 p 2-4 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

Industrial robots play an important part in conversion of automated high volume production lines from stiff ones designed for a few product items to flexible or fast readjustable ones designed for more product items. In the production of electrical machines, specifically, it is necessary to automate completely and robotize not only machining operations but also forging and casting operations as well as galvanizing and painting processes, and reprocessing of thermoplastic and thermosetting materials. Approximately 30 models of industrial robots will be introduced for this by 1986, second generation adaptive robots with artificial intelligence to be ready by 1990. Among the robots, developed by the All Union Design Engineering Institute of Electrotechnology jointly with the Central Scientific Research Institute of Robotized Technological Complexes are the PREM series ones with load lifting capacities of 0.5, 5, 25, and 63 kg. Production of electric motors have a high priority, because electromechanical drives are used for manufacturing of more than 80% of all industrial products. Author

N85-12223# Joint Publications Research Service, Arlington, Va.
MODULAR ELECTROMECHANICAL INDUSTRIAL ROBOTS Abstract Only c37
S. V. Gruzdev, O. B. Korytko, and Ye. I. Yurevich *In its* USSR Rept.: Electron and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 15 Transl. into ENGLISH from Elektrotek. (Moscow), no. 4, Apr. 1984 p 4-7 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

A total line of modular electromechanical industrial robots is being developed in the USSR, to cover the 0.2-160 kg range of load lifting capacity with three basic models: PREM-0.5, PREM-5, PREM-100. The major five components of each robot are the manipulator, drive, drive control, gripping device, gripping device control mechanically or electrically coupled as appropriate. The mechanical part of an industrial robot can be standardized through structural uniformity, or through minimum dependence of the robot design on the form of energy used and on the method of control, or on nameplate delivery interchangeability basis with maximum degree of functional and structural completeness, or for selectivity of internal manufacturing and engineering implementation of the design, or through minimization of the number of module sizes. The principal modules in all robots of this line are third level functional ones, their principal performance parameter being the installed motor power and their other essential performance parameters being force or torque, travel, nominal velocity, and absolute positioning error of the output link. B.W.

N85-12224# Joint Publications Research Service, Arlington, Va.
INTERNATIONAL EXHIBITION: INDUSTRIAL ROBOTS, 1982 Abstract Only c37
V. G. Galenko, B. M. Bodrov, and V. V. Shishkin *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 15-16 Transl. into ENGLISH from Elektrotek. (Moscow), no. 4, Apr. 1984 p 9-12 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

At the international exhibition Industrial Robots '82 in Leningrad (October 1982) the latest achievements were displayed in flexible automated production lines with digital program control through microprocessors and minicomputers. The industrial robots exhibited here were auxiliary ones for parts handling (transport, loading, unloading), technological ones for parts processing (electric welding, coating), and technological ones for final operations (assembly). The exhibits demonstrated the prevalent trend toward modular construction, greater complexity for greater versatility, positional and outline tracing control with linear and circular interpolators, more precise positioning within + or - 0.02 mm, and more degrees of freedom up to six, also toward a common relative system of measurements for controls. Most outstanding were the modular industrial robots exhibited by Bosch GmbH (FRG), the universal industrial robots Puma and Kawacaki Unimate (Finland-US), the automatic manipulators Pirin (Bulgaria) and 2-4 hands operating sequentially or simultaneously and the industrial robots Berove (Bulgaria) with hydraulic drive operating in cylindrical coordinates, and the industrial robot Fanuc model 0 with CNC Fanuc 6T computer (Japan) incorporated in the ATM001 automatic production module (Bulgaria). B.W.

N85-12225# Joint Publications Research Service, Arlington, Va.
ROBOTIZATION OF ELECTRIC WELDING PROCESSES Abstract Only c37
Yu. A. Klochkov and V. S. Korshunov *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 16-17 Transl. into ENGLISH from Elektrotek. (Moscow), no. 4, Apr. 1984 p 13-14 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

The purpose for using industrial robots for electric spot welding is to combine the advantages of high volume automation and flexible manual production while reducing the disadvantages of both, namely stiffness and high labor cost, respectively. According to ASEA's (Sweden) production data covering the West European welding industry, replacement of manual welding with a robot is economically justified for an annual production of 1000-60,000 units. The welding robot developed in the USSR jointly by the All Union Design Engineering Institute of Electrotechnology and the All Union Scientific Research Technological Institute of Electric Welding Equipment consists of a PREM-25 manipulator for the torch, a torch with rod feeding mechanism, an arc supply source, a manipulator for the parts, extensive programming with automatic selection and, if necessary, adaptive control. The torch manipulator has a rotation module, a double oscillation module, and a 2 stage wrist module. This modular structure and use of series 4A induction motors in the electrical servomechanism are outstanding features of this industrial welding robot. B.W.

N85-12226# Joint Publications Research Service, Arlington, Va.
ROBOTIZATION OF TECHNOLOGICAL PROCESSES IN HIGH-FREQUENCY HEATING AND WELDING Abstract Only c37
F. V. Bezmenov, S. Ye. Ryskin, V. G. Shevchenko, and Yu. F. Shukkel *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 18 Transl. into ENGLISH from Elektrotek., (Moscow), no. 4, Apr. 1984 p 18-19 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

Industrial robots are considered for performance of auxiliary operations in high-frequency heating and welding, the principal electrothermal process having already been highly automated with adequate control of all parameters. Auxiliary operations now performed manually, tedious handling of hot and often heavy parts, are difficult to automate so as to match the speed and productivity of the principal equipment. No industrial robots for this application are yet available, but conceptualization and development of special-purpose robotized technological complexes on the basis of the PREM-25 modular electro-mechanical industrial robot are

under way. Appropriate modifications, especially of the manipulator gripping device, for such operations as feeding forged ingots into an induction furnace, preheating steel flange rings before calibration, preheating powder-metal pellets before stamping, or welding storage bins appear to be both worthwhile and promising. Author

N85-12227# Joint Publications Research Service, Arlington, Va.
IMPROVING OPERATIONAL RELIABILITY AND PRODUCTIVITY OF ROBOTIZED TECHNOLOGICAL COMPLEXES Abstract Only **c37**
V. G. Galenko, Yu. Ye. Onichikin, and I. M. Belyavskiy *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 18-19 Transl. into ENGLISH from Elektrotek. (Moscow), no. 4, Apr. 1984 p 19-22 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

Existing automation of industrial processes such as strip or sheet stamping is being converted to a higher level, i.e., to flexible automated production lines including a robotized technological complex, for the purpose of improving both productivity and reliability. The model PRP-5 industrial robot is eminently suitable for this particular process. Special manipulator gripping devices have been developed for unrolling and feeding strip or sheet off the reel. The gripping device for handling ferromagnetic materials essentially consists of a carriage on rollers with slidable fingers which carry magnets. The gripping device for handling non-magnetic materials essentially consists of a cantilever beam carrying a spring-loaded cross arm and a set of spring-loaded vacuum suction cups which press on diaphragms. Most important for failure-free operation is proper separation of the strip or sheet from the reel. Stability of monitoring and control sensors is enhanced by installation of shock and vibration absorbers, viscous dampers having been found to be most effective and their design still being refined with emphasis on seals. Introduction of these features developed by the All-Union Design Engineering Institute of Electrotechnology should increase productivity by 20% and reduce losses on restoration of broken doen equipment as well as the cost of standby capacity. Author

N85-12228# Joint Publications Research Service, Arlington, Va.
AUTOMATION OF ASSEMBLY OF ELECTRICAL PRODUCTS Abstract Only
V. A. Lebedenko *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 19-20 Transl. into ENGLISH from Elektrotek. (Moscow), no. 4, Apr. 1984 p 25-27 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

Approaches to the operation of a production line with a free rather than rigid tempo and cycles are discussed, along with the installation of a interoperational transport with trays rather than a continuously moving convey belt and the use of standard technological equipment in lieu of small scale mechanization. The design of a production line which follow these principles is examined. The advantages as well as the disadvantages of such a system are considered in the development of an automated flexible production line with robotized technological complex. A single flexible assembly line for the hookup operations with the most important link, the automatic manipulator for joining the product components together, consists of modules classifiable into six groups: (1) movers of the base parts; (2) feeders and orientators of parts; (3) joiners of parts; (4) carriers and holders of parts; (5) inspection and control systems; and (6) fasteners of parts. E.R.

N85-12229# Joint Publications Research Service, Arlington, Va.
AUTOMATION OF PRODUCTION OF SEMICONDUCTOR POWER DEVICES Abstract Only
R. V. Kyuts and G. K. Toomsoo *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 20-21 Transl. into ENGLISH from Elektrotek. (Moscow), no. 4, Apr. 1984 p 28-33 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

An informational consultative automatic system for control of technological processes is being developed. Then automatic control systems for groups of technological processes are being developed, essentially with a computer base. Its accounting functions include tracking of parts, statistical analysis of product lots, inspection and correction for excessive reject rate. Its control functions include adaptive simulation of technological processes, with stabilization and correction, and predicting characteristics. The software consists of general and special programs. The hardware consists of modular computers with expanded memory on three magnetic disks and four magnetic tapes, workshop terminals with teletypes, and testers. The data processing part consists of minicomputer with peripheral equipment. The testing part includes means of transporting as well as heating and cooling the test samples, and inserting them into the test circuit adequate electrical contact. Author

N85-12230# Joint Publications Research Service, Arlington, Va.
MEASUREMENTS OF POLARIZATION CHARACTERISTICS OF RADIATION FIELD OF ON-BOARD AIRCRAFT ANTENNAS Abstract Only **c32**
E. D. Gazazyan and V. G. Panchenko *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 28 Transl. into ENGLISH from Metrologiya (Moscow), no. 6, Jun. 1984 p 44-49 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

A method for measuring the polarization characteristics of onboard antennas is analyzed in which an aircraft following an assigned trajectory is tracked from the ground and its angle of evolution with respect to the center of mass and the signal parameters at the output of the master antenna on the ground are measured. It is determined that rectilinear horizontal trajectories with no pitch or roll of the vehicle should be used. The requirements for the pitch and roll transducers must be made stiffer when selecting angle of measurement means; methods based on measuring amplitude ratios should be used when selecting a method for measuring the polarization characteristics of onboard antennas with arbitrary polarization. Author

N85-12231# Joint Publications Research Service, Arlington, Va.
SPECTRAL NOISE DENSITY AND RANDOM ERRORS OF PULSE FREQUENCY CHARACTERISTIC METERS Abstract Only **c32**
A. V. Purtov and Ye. V. Krsheminskaya *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 29 Transl. into ENGLISH from Metrologiya (Moscow), no. 6, Jun. 1984 p 50-54 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

Formulas are derived for estimating the errors of automated pulse-reflectometer systems for measuring the frequency and phase characteristics of microwave components. The factors influencing errors in measuring the coefficient of transmission or reflection are analyzed. Sweep instability noise is investigated on the basis of a stroboscopic convertor consisting of a sample and store device which forms a stairstep signal from a periodic sequence of pulses under the influence of gaping pulses applied to the switch in a particular order. The energy characteristics of the process of the output of the convertor are studied. The required accuracy can be obtained in automated pulse reflectometer systems by additional digital processing of the signals from a gating oscilloscope in the time or frequency domain. Author

N85-12232# Joint Publications Research Service, Arlington, Va.
NONLINEAR ELECTROMAGNETIC WAVES IN FERROMAGNETIC CONDUCTING MEDIA Abstract Only **c32**
F. G. Bass and N. N. Nasonov *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 30 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorky, USSR), v. 27, no. 5, May 1984 p 642-654 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

Highly nonlinear electromagnetic waves in ferromagnetic semiconductors are investigated. Unidimensional periodic and single circularly polarized waves propagating along a constant magnetic field in an isotropic medium are examined. The analysis is performed within the framework of a hydrodynamic description of the conductivity plasma. The magnetization dynamics are

described by a Landau-Lifshits equation disregarding heterogenous exchange. Waves with and without drift of the charge carriers are studied. A general analytical solution to the problem of the propagation of a nonlinear monochromatic wave in a conducting ferromagnet is derived. Stationary waves of envelopes in ferromagnets with drift of the charge carriers are examined. Author

N85-12233# Joint Publications Research Service, Arlington, Va.
NUMERICAL INVESTIGATION OF DIFFRACTION MODELS OF MICROWAVE INTEGRATED CIRCUITS Abstract Only c32
V. V. Nikolskiy and T. I. Nikolskaya *In its* USSR Rept.: Electron and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 32 Transl. into ENGLISH from Izv. Vyssh. Zaved.: Radiofiz. (Gorky, USSR), v. 27, no. 5 p 669-674 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

A stripline stub on a suspended substrate is examined. The multimode scattering matrices of the two identical jumps picking up the stub are determined by projection sewing of the systems of intrinsic waves of the narrow and wide lines. The multimode scattering matrix of the stub is found by combining the scattering matrices of the two jumps with allowance for an intermediate segment of regular line with a wide conductor. Two algorithms are constructed, one of which finds the intrinsic waves of the stripline conductor (impedance version) and the other formulates the integral equation with respect to the tangential electrical field in the boundary region (admittance version). It is found that the higher harmonics in Trefftz bases have little influence on the characteristics obtained for the fundamental wave. Author

N85-12234# Joint Publications Research Service, Arlington, Va.
GENERATION OF SUPERPOWERFUL MICROSECOND ELECTROMAGNETIC RADIATION PULSES Abstract Only c32
S. P. Bugayev, V. I. Kanavets, A. I. Klimov, V. I. Koshelev, P. A. Khryapov, and V. A. Cherepenin *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 32-33 Transl. into ENGLISH from Rasiotek. i Eletrotek. (Moscow), v. 29, no. 5, May 1984 p 994-996 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

The findings from investigations of a multi-mode Chernekov oscillator producing an elongated microwave pulse are presented. The power distribution of the electromagnetic radiation in the plane of the output aperture of the experimental device is analyzed. The power and pulse length are found as a function of the inductance of the magnetic field. It is shown that the length of the microwave pulse is limited by high-frequency breakdown of the delay structure as well as by nonlinear effects occurring when the electron beam interacts with multiple modes of the electromagnetic field. R.J.F.

N85-12235# Joint Publications Research Service, Arlington, Va.
SCATERING OF ELECTROMAGNETIC WAVES IN FLAT WAVEGUIDE WITH BILATERAL DIAPHRAGMS Abstract Only c32
V. D. Lukyanov and G. L. Nikitin *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 33-34 Transl. into ENGLISH from Z. Tek. Fiz. (Leningrad), v. 54, no. 5, May 1984 p 865-872 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

The propagation of stationary electromagnetic waves (scalar problem) in an infinite flat waveguide with a bilateral diaphragm is examined. The walls of the waveguide and the transverse diaphram are conductors with infinite conductivity. An exact solution is derived for the problem of stationary scattering of a normal wave by reduction to a Riemann matrix problem for two pairs of analytical functions. The second-order matrix function is factored in closed form. Expressions are derived for the coefficients of refraction and transformation of the incident normal waves. It is found that the solution to the problem is analogous to the case in which the Neumann boundary condition is satisfied at the boundary of the waveguide. Author

N85-12236# Joint Publications Research Service, Arlington, Va.
FUNCTIONAL CHECKING OF MICROPROCESSORS AND MICROPROCESSOR SYSTEMS Abstract Only c60
P. A. Arutyunov and N. B. Gomanilova *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 37 Transl. into ENGLISH from Mikroelektron. (Moscow), v. 13, no. 4, Jul. - Aug. 1984 p 356-366 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

The problem of metrological support for larger scale integrated microprocessor circuits and microprocessor systems is considered from the viewpoint of a hierarchical functional checking and diagnostic system consisting of three levels: physical, circuitry, and system. Modern methods of testing and diagnosing microprocessor and microprocessing system malfunctions are compared; promising directions in the development of checking and diagnostic methods are examined. Examples of checking and diagnostic equipment are presented. Analysis of existing methods and means for checking large scale integration microprocessors points up the unsuitability of traditional approaches which disregard the architecture, circuit engineering, and system engineering of the object checked. Microprocessor and microprocessor checking is facilitated by incorporating devices in their architecture to assure checkability at the physical, circuitry, and system levels. Author

N85-12237# Joint Publications Research Service, Arlington, Va.
CIRCUIT ENGINEERING AND TECHNOLOGICAL OPTIMIZATION OF VERY HIGH SPEED LSI LOGIC ELEMENTS AND TRANSISTOR STRUCTURES Abstract Only c33
A. N. Bubennikov *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 38 Transl. into ENGLISH from Mikroelektron. (Moscow), v. 13, no. 4, Jul. - Aug. 1984 p 367-375 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

The prospects of adapting the structural and technological parameters of logic elements and concurrent current circuit engineering and technological optimization of logic elements and transistor structures are examined. It is found that concurrent optimization makes it possible to achieve better VLSI circuit use from the viewpoint of the level of circuitry and base technological implementation achieved. Adaptation of the structural and technological parameters of a transistor structure manufactured by the base technology to the power consumption of the logic elements makes it possible to achieve maximum speed. R.S.F.

N85-12238# Joint Publications Research Service, Arlington, Va.
CALCULATION OF ENERGY CHARACTERISTICS OF DOUBLE-PASSAGE AMPLIFIER Abstract Only c33
A. A. Betin, A. I. Dyatlov, S. N. Kulagina, S. V. Kulagin, N. D. Milovskiy, and V. Ya. Sherstobitov *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 49 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorky, USSR), v. 27, no. 5, May 1984 p 557-564 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

Amplification of the return waves in a two-level active medium with a uniformly broadened transition line is investigated. The gain, output intensity, and efficiency of a double-passage amplifier are computed as a function of the amplifier parameters and the input signal level using an approximation of planar monochromatic waves. It is shown that radiation losses caused by absorption in the matrix of the active substance, or caused by incomplete reflection from the mirror behind the amplifier, result in optimal operating modes of the double-passage amplifier which correspond to a maximum efficiency of intensity of the output radiation. Even a slight reduction in the divergence of the output radiation (by less than a factor of 2) makes it possible (by exploiting the wavefront phase conjugation effect) to create a more efficient laser system with better radiation power density per unit of solid angle. Author

N85-12239# Joint Publications Research Service, Arlington, Va.
FREQUENCY SHIFTING IN MULTIMODE FIBER OPTIC PHASE MODULATION DEVICES Abstract Only c33

V. Yu. Petrunkin, O. I. Kotov, and V. N. Filippov *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 49-50 Transl. into ENGLISH from Z. Tek. Fiz. (Leningrad), v. 54, no. 5, May 1984 p 955-957 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

The possibility of shifting the frequency of modulation signals in a multimode light guide by exploiting internal interference phenomena is demonstrated. Two modes of conversion of phase modulation to amplitude modulation in the same multimode light guide are investigated: differential phase modulation and interference between light beams passing through the light guide and rereflected from its ends. An expression is derived for the amplitude of a differential modulated signal. Phase modulation of coherent radiation in a fiber optic light guide is found to be a parametric process. When two modulators operate simultaneously, the spectra of the differential phase modulation and signal echo contain combination frequencies because of the parametric conversion. Parametric frequency conversion is useful for developing heteodyne and frequency multiplexing devices. Author

N85-12240# Joint Publications Research Service, Arlington, Va.
EFFICIENCY OF PHOTOELECTRIC CONVERSION OF SHORT RADIATION PULSES Abstract Only **c33**
V. D. Rumyantsev and N. M. Saradzhisvill *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 50 Transl. into ENGLISH from Z. Tek. Fiz. (Leningrad), v. 54, no. 5, May 1984 p 979-982 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

The capability of AlAs-GaAs strong-current photocells to convert nanosecond light pulses with photocurrent densities of 10A to 100 A/sq cm is investigated theoretically and experimentally. The variation in the load voltage-current characteristic is investigated experimentally by irradiating the subject photocells with a Q-modulated ruby laser. The characteristic time of the photocell required for efficient photoelectric conversion of short radiating pulses is determined. It is found that the radiation pulse itself must be close to rectangular in order to avoid losses occurring when the light flux varies. Author

N85-12241# Joint Publications Research Service, Arlington, Va.
PULSED NEODYMIUM GLASS LASER SYSTEM FOR INVESTIGATING NONLINEAR OPTICAL PHENOMENA IN GASES Abstract Only **c36**
V. F. Lukinkh, S. A. Myslivets, and V. V. Slabko *In its* USSR Rept.: Electron and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 50-51 Transl. into ENGLISH from Z. Tek. Fiz. (Leningrad, v. 54, no. 5, May 1984 p 879-882 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

A powerful frequency-tunable neodymium glass laser active mode-locked laser system is described. Near-complete mode locking is provided by periodic Q-modulation of the resonator in combination with spectral selection of longitudinal types of oscillation. Preliminary findings from experiments in generating the seventh harmonic in mercury vapor are cited. The output parameters of the laser satisfy the conditions for experiments on generating higher harmonics of the fundamental radiation. The pulse length of the periodic Q-modulated laser is independent of the spectrum width of the radiation generated in the band extending from several tens to several tenths of a centimeter. The periodic Q-modulation scheme can be used for active mode locking. Author

N85-12242# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF MODE NOISE SUPPRESSION IN MULTIMODE FIBER OPTIC LIGHT GUIDES Abstract Only **c74**
V. Yu. Petrunkin, O. I. Kotov, and V. N. Fillipov *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 51 Transl. into ENGLISH from Z. Tek. Fiz., v. 54, no. 5, May 1984 p 883-887 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

The possibility of noise suppression in a fiber optic light guide with a coherent radiation phase modulator in a specified frequency band is demonstrated experimentally. An experimental setup incorporating an LG-78 single mode gas laser and a PF-150-60 fiber optic multimode light guide 5 meters long are described. The noise component spectrum is measured with an SK4-26 spectrum analyzer. Mode noise is viewed as the result of random phase modulation of coherent radiation in the fiber. Conversion occurs by virtue of internal interferometric phenomena. Reduction of mode noise in a given spectral band significantly by phase modulation of coherent radiation in a multimode light guide is shown to be possible. Author

N85-12243# Joint Publications Research Service, Arlington, Va.
CHARACTERISTICS OF LIGHT DIFFRACTION BY TWO ACOUSTIC WAVES, ONE WITH COMPLEX FREQUENCY COMPOSITION Abstract Only **c71**
Yu. G. Vasilyev *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 54 refs Transl. into ENGLISH from Radiotek. i. Elektron. (Moscow), v. 29, no. 5, May 1984 p 866-870 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

Bragg diffraction of light by two orthogonal acoustical waves, one of which is excited by a complex radio signal, and the other is excited in an elastic medium by an amplitude-modulated signal with complex frequency spectrum is examined. The energy of the incident wave is found to be distributed among two scattered components, the intensity of one of which is proportional to the square of the envelope of the complex signal. The diffraction applied by two orthogonal acoustic waves can be exploited for two-dimensional optical scanning in two-coordinate acousto-optical deflectors, as well as for processing complex radio signals, e.g., extracting their energy-time structure. A method is presented for calculating the wave parameter Q and the length of acousto-optical interaction which can be used to describe the operation of two-coordinate acousto-optical processors for low distortion levels of the diffracted light. Author

N85-12244# Joint Publications Research Service, Arlington, Va.
USSR REPORT: MATERIALS SCIENCE AND METALLURGY 24 Oct. 1984 69 p Transl. into ENGLISH from various Russian articles
(JPRS-UMS-84-007) Avail: NTIS HC A04/MF A01

Some subject areas of materials science and metallurgy covered include aluminum and it alloys, amorphous metals, metal coatings, energy effects, steels, superalloys, thin films, titanium and welding. Many properties of alloys are studied such as crack resistance, structural relaxation, annealing effects, aging under stress, plasticity, fatigue and fracturing, and tensile properties. The effect of laser radiation is examined as is the feasibility of producing ultrafine powders, and titanium alloying systems. Some miscellaneous topics are noiseless alloys, plasma beam method for reconditioning turbine blades, superpure material research, improved reinforcement metal and producing semiconductor materials by superfast cooling of melt. For individual titles, see N85-12245 through N85-12274.

N85-12245# Joint Publications Research Service, Arlington, Va.
CRACK RESISTANCE OF PRESSED AND ROLLED SEMIFINISHED GOODS OF ALUMINUM ALLOYS USED IN LOAD-BEARING AIRCRAFT WING STRUCTURES Abstract Only **c26**
A. G. Vovnyanko and A. M. Dotsenko *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 1 Transl. into ENGLISH from Fiz.-Khim. Mekhan. Materialov (Kiev), v. 20, no. 2, Mar. - Apr. 1984 p 99-102 Original language doc. previously announced in IAA as A84-35724 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

The growth rate of cracks 30-500 mm long and with large stress intensity factors is analyzed in specimens of the alloys D16chT, V95pchT1, V95pchT2, 1161T, and 1163T which are used in aircraft panels and wind-box skin. The conditional stress intensity

factors characterizing the residual strength of thin-walled structures with a crack are determined. The influence of thickness on crack resistance was studied in semifinished products 4, 8, and 12 mm thick that were cut with the grain. The influence on crack growth rate of sigma-max, which ranged from 68.5 to 216 MPa, was also examined. According to cyclic crack resistance and the conditional critical stress intensity factor, pressed panels of D16chT were superior to rolled slabs of the same alloy. The application of a softening aging regime T2 instead of T1 for the V95pch alloy significantly lowered the crack growth rate, especially for high values of K-max. J.N.(AIAA)

N85-12246# Joint Publications Research Service, Arlington, Va.
PARAMETERS OF STRUCTURAL RELAXATION AND MECHANICAL PROPERTIES OF AMORPHOUS ALLOYS Abstract Only c26

A. M. Glezer and O. L. Tevskaya *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 2 Transl. into ENGLISH from Fiz. Metallov i Metalloved. (Sverdlovsk, USSR), v. 57, no. 6, Jun. 1984 p 1198-1210 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

The relation between mechanical properties of alloys Fe-B, Fe-Ni-P and Fe-Ni-P-B and their structural relaxation during annealing was established in an experimental study involving microhardness, electrical resistivity, and plastic deformation measurements as well as dilatometry with an ULVAC-TA-1500 apparatus at a heating rate of 2 deg C/min, fractography after uniaxial tension tests under a scanning electron microscope with x5000-60,000 magnification and low angle high resolution diffractometry with Co-K sub alpha radiation. Specimens of all alloys in the form of 20-50 micrometers-thick and 1-22-millimeters-wide ribbons were produced by quenching from the melt by the spinning method. They were heat treated in a vacuum furnace at temperatures ranging from 50 to 450 deg C for periods of time ranging from 6 min to 10 h. An evaluation of the data with the aid of regression analysis, and using the concept of vacant spaces as a form of defects, has yielded the dependence of the Vickers hardness and the yield point of Fe-Ni-P and Fe-Ni-P-B alloys on the parameters of their preparation process and subsequent heat treatment, and also of the electrical resistivity of Fe-Ni-P and Fe-P alloys on the heat treatment parameters. Author

N85-12247# Joint Publications Research Service, Arlington, Va.
EFFECT OF ANNEALING IN TRANSVERSE MAGNETIC FIELD ON MAGNETIC PERMEABILITY OF AMORPHOUS Fe5Co70Si15B10 ALLOY Abstract Only c26

I. B. Kekalo, A. N. Zhdanov, and V. Yu. Tsvetkov *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 3 Transl. into ENGLISH from Fiz. Metallov i Metalloved. (Sverdlovsk, USSR), v. 57, no. 6, Jun. 1984 p 1213-1215 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

Annealing of crystalline and amorphous magnetically soft materials in a longitudinal magnetic field improves some of their magnetic properties but decreases their initial magnetic permeability, annealing them in a transverse magnetic field does, under certain conditions, increase it. It was demonstrated experimentally on the Fe5CO70S15B10 alloy, which has the Curie point at 370 C and the crystallization point at 500 deg C according to differential thermographic analysis. Toroidal specimens of this alloy were produced by the method of quenching from the melt on a fast spinning disk. They were subjected to thermomagnetic treatment at 250 deg C (below the embrittlement point), in a longitudinal field of 800 A/m intensity and in a transverse magnetic field of 5.6x100,000 A/m intensity, then held at that temperature for 18 h. It thus appears feasible to appreciably increase the initial magnetic permeability of an alloy without transition from nonmagnetostrictive to brittle state when the Curie point is lower than the crystallization point. When the Curie point is higher, it is possible to achieve this without resorting to laborious treatment in a rotating magnetic field. Author

N85-12248# Joint Publications Research Service, Arlington, Va.
MAGNETIC PROPERTIES OF AND SUPERFINE INTERACTIONS IN AMORPHOUS Fe-Cr-Co-Si-B ALLOYS Abstract Only c26

In its USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 4 Transl. into ENGLISH from Fiz. Metallov i Metalloved. (Sverdlovsk, USSR), v. 57, no. 6, Jun. 1984 p 1094-1100 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

Study of the amorphous Fe80B15Si5 alloy was made for the purpose of determining the effect of adding chromium and cobalt simultaneously in equal amounts on its magnetic properties and crystallization temperature, such a determination being made easier by retention by an amorphous alloy of its single phase structure over a wide range of added element and their concentrations. Specimens of Fe80-2xCrxCoxB15Si5 ($0 < x < or = 14$) in the form of ribbon 20-40 micrometers thick and 1-20 mm wide were produced by spinning the melt. The crystallization point was determined by means of a differential scanning calorimeter during heating at a rate of 10 deg C/min. The magnetic properties were measured by two mutually complementing methods, Mossbauer spectroscopy for microproperties and saturation magnetization for macroproperties. The results indicate that the effect of chromium is predominant, both transition metals influencing the magnetic properties additively within the low $0 < x < or = 8$ range and nonlinearly with a strong effect of annealing within the high $x >$ or $= 8$ range. Author

N85-12249# Joint Publications Research Service, Arlington, Va.
BREAKDOWN OF POROUS METALS BY LASER RADIATION Abstract Only c36

A. A. Uglov and V. A. Grebennikov *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 9 Transl. into ENGLISH from Fiz. i Khim. Obrabotki Materialov (Moscow), no. 3, May - Jun. 1984 p 21-24 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

Breakdown of a powder metal by laser radiation is analyzed, considering first the fundamental characteristics of melting as a quasi-steady process under a constant localized energy flux. Calculations for the typical 100,000 - 10,000,000 7 W/sq cm range of laser radiation density reveal that the trends of the porosity dependence of both the melting depth and the critical radiation flux density for initiation of boiling is determined by two thermophysical properties of the metal powder, namely its latent heat of evaporation and thermal conductivity, as well as by the laser-pulse duration. The melting depth is maximum within the 24-32% range of porosity, the peak becoming sharper and shifting toward lower porosity as the incident radiation flux density increases. Pore kinetics and formation of a crater under high-intensity laser radiation are considered, with the free surface energy taken into account, calculations revealing the role of pores as heat boosters. An approximate relation for the crater depth is derived for process design purposes. Author

N85-12250# Joint Publications Research Service, Arlington, Va.
FEATURES OF PLASTIC DEFORMATION AND FRACTURE OF EP 741 NICKEL ALLOY UNDER THERMAL STRAIN Abstract Only c39

L. P. Gerasimova, M. A. Godovanets, V. F. Kotov, L. Ye. Popova, and V. I. Shvarts *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 19 Transl. into ENGLISH from Poroshkovaya Met. (Kiev), no. 5, May 1984 p 51-57 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

Plastic deformation and fracture of the EP 741 heat-resistant nickel alloy for runners of gas turbines were studied under conditions of thermal strain typical of runner operation, at room temperature and at 750 C. Both powder and wrought forms of this alloy were tested, for a comparative evaluation of their mechanical characteristics. The test results, together with thermo-microscopic and electron-microscopic examination, revealed substantial differences in the microstructure and the behavior of the two materials. After plastic deformation and fracture, powder

specimens were found to have much smaller grains, one order of magnitude smaller than grains in wrought specimens, with sinuous and therefore much longer grain boundaries but without large carbide deposits. An analysis of the kinetics indicates combination intercrystalline and intracrystalline fracture of the powder alloy, following a perdominantly plastic microdeformation under tensile stress. The powder alloy has comparable strength characteristics and much better plastic characteristics, with higher toughness, than the wrought alloy. Author

N85-12251# Joint Publications Research Service, Arlington, Va.
STRUCTURAL STABILITY OF NICKEL HEAT RESISTANT ALLOYS AT HIGH TEMPERATURES Abstract Only **c26**
N. V. Petrushin, A. V. Logunov, and V. A. Gorin *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 20 Transl. into ENGLISH from Metalloved. i Termicheskaya Obrabotka Metallov (Moscow), no. 5, May 1984 p 36-39 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

The temperature of dissolution of the hardening gamma prime phase in the nickel solid solution of EP742 heat resistant alloy was determined. The temperature was determined by the method of electroresistance upon heating of specimens from normal temperature to 95% of the melting point. Analysis indicates that as the quantity of gamma prime phase in the alloy increases, resistivity increases. This is retained at elevated temperatures right up to the beginning of dissolution of the gamma prime phase. A decrease in resistivity of nickel heat resistant alloys at temperature near 900 C may be related to the decrease in volumetric fraction of the phase component which has the greatest resistivity as well as a decrease in the resistivity of the gamma prime phase itself in this same temperature interval. The temperature of full dissolution of the gamma prime phase in this alloy is greatly influenced by the content of aluminum and of titanium. Author

N85-12252# Joint Publications Research Service, Arlington, Va.
TWISTED DOMAIN WALL IN VERY THIN MAGNETIC FILMS WITH PERPENDICULAR ANISOTROPY Abstract Only **c76**
G. Ye. Khodenkov *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 21 Transl. into ENGLISH from Fiz. Metallov i Metalloved. (Sverdlovsk, USSR), v. 58, no. 1, Jul. 1984 p 37-41 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

The theory of twisted domain walls for magnetic films thicker than the Bloch line is extended to very thin magnetic films. Solution of the corresponding two second-order differential equations of energy, which include terms accounting for exchange interaction and uniaxial anisotropy as well as magnetostatic energy consisting of a local component and a long-range component associated with surface charges, reveals that in this case the twist angles are small so as to make a free domain wall a quasi-Blochian one. The maximum steady-state velocity of such twisted domain walls, calculated from the conventional equation, approaches here the Walker limit and is higher than the velocity at saturation in thick magnetic films. All calculations here are made analytically, which is not possible in the case of thick magnetic films. Author

N85-12253# Joint Publications Research Service, Arlington, Va.
EFFECT OF HEAT TREATMENT ON PHASE COMPOSITION AND CRYSTAL STRUCTURE OF THIN WSI2 FILMS ON SILICON SUBSTRATES Abstract Only **c76**
Ye. P. Biryukov, A. P. Dostanko, A. A. Maltsev, and G. M. Shakhlevich *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 22-23 Transl. into ENGLISH from Poverkhnost: Fiz., Khim., Mekhan. (Moscow), no. 6, Jun. 1984 p 97-102 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

An experimental study of WSi2 films on silicon substrates with either <111> or <100> orientation was made, for the purpose of determining the effect of annealing by heat treatment on their phase composition and crystal structure. Films of 0.2 micron thickness were deposited at a rate of 0.5 nm/s on a silicon surface which was predecontaminated of SiO2 layers and adsorbate atoms by ion sputtering in one vacuum cycle. Deposition was by condensation, with the substrate held at various temperatures from 390 to 500 C, and then annealed in an argon atmosphere at various temperatures from 700 to 1000 C for 30 min. Subsequent phase analysis at room temperature was performed with a DRON-2 X-ray diffractometer, using a CuK (sub alpha)-radiation source and covering the 20 = 10 to 130 deg range of angles by the Debye-Sherer method, while the surface morphology was examined under an electron microscope. B.G.

N85-12254# Joint Publications Research Service, Arlington, Va.
ONE-DIMENSIONAL MODEL OF THIN FILMS. ANALYSIS OF ALUMINUM SURFACE Abstract Only **c76**
S. N. Bezryadin, V. D. Verner, and T. I. Yegorova *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 23 Transl. into ENGLISH from Poverknost: Fiz., Khim., Mekhan. (Moscow), no. 6, Jun. 1984 p 43-46 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

A self-consistent one-dimensonal model with a potential depending on the crystal structure is proposed for analysis of crystalline surface films, in lieu of the jelly model and full three-dimensional equations. The three components of the electron-film interaction potential account for electron ion interaction, exchange-correlational interaction, and Coulomb interaction of valence electrons respectively. The potential of an ion does not change, in the first approximation, as the ion is transported from inside the crystal to the surface. Therefore, any tabulated pseudopotential with a form factor accounting for Coulomb interaction of valence electrons is suitable for calculations. The corresponding Schroedinger equation is solved in the momentum space. The discrepancy between experimental and theoretical results with relaxation accounted for is attributable to imprecise evaluation of the Coulomb interaction between valence electrons, which depends on the assumed electron density distribution in the crystal. B.G.

N85-12255# Joint Publications Research Service, Arlington, Va.
KINETICS OF FATIGUE FACTOR OF AT3 TITANIUM ALLOYS IN AIR, DISTILLED WATER AND 3.5% AQUEOUS NaCl SOLUTION Abstract Only **c26**
L. R. Botvina, S. Ya. Yarema, O. P. Ostash, and I. B. Polutranko *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 24 Transl. into ENGLISH from Fiz.-Khim. Mekhan. Materialov (Kiev), v. 20, no. 2, Mar. - Apr. 1984 p 17-22 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

The development of fatigue cracks in AT3 titanium alloy upon testing in air (relative humidity 50 to 70%), distilled water and a 3.5% NaCl solution are presented. Results are compared with data from quantitative analysis of fracture microrelief. Alloy composition: 2.0 to 3.5% Al, 0.2 to 0.5% Cr, 0.2 to 0.4% Si, 0.2 to 0.5% Fe, remainder Ti. Disk specimens were prepared from rolled sheets 7 mm thick, specimen diameter 230 mm, thickness 4 mm, with a central crack for testing in uniaxial extension. Distilled water and 3.5% NaCl have little influence on cyclical strength of AT3 alloy. Beginning at a certain load level there is a break on the kinetic fatigue fracture diagram and elements of static fracture appear on the fracture surface. Author

N85-12256# Joint Publications Research Service, Arlington, Va.
STUDY OF STRUCTURE OF SPONGE TITANIUM VARIETIES Abstract Only **c26**
V. A. Likhterman, A. N. Pozdnyakov, R. Ye. Shiryayev, F. B. Khalimov, T. V. Goncharenko, and O. A. Golubeva *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 24-25 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Tsvetnaya Met. (Ordzhonikidze, USSR), no. 2, Mar. - Apr. 1984 p 33-38 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

The structural specifics of defective varieties of sponge titanium as compared to technically pure titanium were studied. Analysis was performed by mercury porometry, quantitative image analysis,

thermal desorption of argon and electron microscopy. The variety of structural characteristics of technically pure and impure sponge titanium were indicated. Even a single variety showed significant differences in surface morphology, porosity and specific surface as functions of structure. This results from differences in parameters of technological processes, initial raw material quality and location of specimen in the sponge titanium block. Structural characteristics therefore cannot be the only characteristics for rapid defectoscopy of sponge titanium lumps. Author

N85-12257# Joint Publications Research Service, Arlington, Va.
STRUCTURE OF TWO-PHASE TITANIUM ALLOYS WITH DIFFERENT MICROSTRUCTURES c26
A. S. Fedotov *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 25-26 Transl. into ENGLISH from Metalloved. i Termicheskaya Obrabotka Metallov (Moscow), no. 5, May 1984 p 55-57 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

Two phase titanium alloys are discussed including three types of microstructures. The first group are alloys with globular alpha phase separated by interlayers of beta phase. The second group includes alloys with beta converted microstructures consisting of plates of alpha phase separated by interlayers of beta phase. Interlayers of beta phase may be present along the boundary of the former beta grain. The third group includes alloys with a mixed structure. The properties of the alloys are divided into two groups which characterize the resistance of the alloys to fracture under the influence of static and cyclic loads. The mechanism of fracture of two phase titanium alloys under the influence of static and of cycylical loads is described. An increase in toughness of fracture of specimens with a microstructure including the plate component which resulted from the increase in crack path length due to the convolution of the path and the increase in the force necessary to cause a crack to propage was observed. The birth of a fatigue crack is facilitated by the transformed component of the microstructure present; the time before the formation of the first crack is thus reduced. It is suggested that to assure effective resistance of titanium alloys to the formation of fatigue cracks, the dimensions of alpha grains and the length of their boundaries must be decreased. E.A.K.

N85-12258# Joint Publications Research Service, Arlington, Va.
STRUCTURAL RECRYSTALLIZATION IN TITANIUM Abstract Only c26
D. A. Mirzayev, V. M. Schastlivtsev, M. M. Shteynberg, and V. G. Ulyanov *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 26 Transl. into ENGLISH from Fiz. Metallov i Metalloved. (Sverdlovsk, USSR), v. 58, no. 1, Jul. 1984 p 69-75 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

Beta to alpha to beta transformations in titanium for determination of the dependence of the beta phase grain size after a single alpha to beta transformation and of the alpha phase recrystallization during annealin on the quenching rate was studied. Specimens of titanium were produced by the iodiding process and resmelting with an electron beam. The beta to alpha transformation temperature was determined from the bend along the cooling curve recorded by Chromel-Alumel thermocouples. Strain widening of the 220 CuK sub O interference line was measured by X-ray structural analysis, in addition to measurements of microhardness and grain dimensions. It is shown that the mode of structural recrystallization during alpha to beta transformation does depend on the quenching rate, while the grain size remained unchanged in titanium which has quenched slowly at rates up to 104 deg C/s but is decreased in titanium which has been quenched faster. Recrystallization of alpha phase titanium during annealing can occur, when earlier quenching has produced martensite in the form of either lamellas or twin crystals. E.A.K.

N85-12259# Joint Publications Research Service, Arlington, Va.
ENERGY OF STACKING FAULT AND DISLOCATION STRUCTURE OF TITANIUM ALLOYS Abstract Only c26
Yu. N. Petrov, V. L. Svechnikov, and G. N. Nadezhdin *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 27 Transl. into ENGLISH from Fiz. Metallov i Metalloved. (Sverdlovsk, USSR), v. 58, no. 1, Jul. 1984 p 7-80 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

Buildup of stacking faults in the form of lengthy dislocation nodes in pure alpha-titanium and in its substitutional alloys with molybdenum, vanadium, or aluminum was analyzed. The principal factor was the energy of such a fault and its temperature dependence. Earlier electron microscope examination of alpha titanium and titanium-aluminum alloys produced by electron beam resmelting of iodided titanium showed an absence of triplet dislocation nodes in a cph lattice but a presence of lengthy dislocation nodes inside dislocation twins or martensite lamellas, particularly in titanium-aluminum alloys with more than 6 wt.% Al corresponding to Ti3Al and TAl compositions. Calculations for two temperatures, 100 deg K and 600 deg K, yield results which qualitatively agree with available data on the structure of these titanium alloys. It is confirmed that molybdenum and vanadium increase the stacking fault energy while aluminum decreases it. These changes become larger with rising temperature. E.A.K.

N85-12260# Joint Publications Research Service, Arlington, Va.
STRUCTURE AND PROPERTIES OF TITANIUM ALLOYS AFTER ISOTHERMAL DEFORMATION AT LOW SPEEDS Abstract Only c26
V. N. Moiseyev, I. A. Povarov, and Yu. I. Kaplin *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 29 Transl. into ENGLISH from Metalloved. i Termicheskaya Obrabotka Metallov (Moscow), no. 5, May 1984 p 43-46 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

The change in structure of titanium alloys of various types in the temperature deformation interval from 600 to 1000 deg C at rates of 0.2 to 200 mm/min with overall deformation 25 to 75% establishes the optimal parameters for processing each of the alloys was studied. The optimal temperature for deformation is 20 deg C below the alpha + beta to beta transition for alloys of subcritical composition, while for more highly alloyed metals it is in the 820-750 deg C interval. Deformation rates are determined by specific metal flow pressure and the output of the pressing equipment. The specific metal flow pressure depends on the temperature of polymorphous transformation of the alloy and the strength of the alpha and beta phases at the deformation temperature. Decreasing deformation rate decreases specific metal flow pressure, particularly at lower alpha+beta to beta transition temperatures. Titanium alloys of supercritical composition with soft alpha + beta structural components are of the great interest for isothermal deformation at low speeds and low temperatures. E.A.K.

N85-12261# Joint Publications Research Service, Arlington, Va.
STRUCTURE AND DUCTILITY OF FRACTURE OF JOINTS PRODUCED BY ELECTRON-BEAM WELDING OF VT6ch TITANIUM ALLOY PARTS Abstract Only c39
V. I. Trefilov, Ye. V. Turtsevich, S. M. Gurevich, and A. D. Shevelev *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 32 Transl. into ENGLISH from Avtomat. Svarka (Kiev), no. 5, May 1984 p 38-40 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

Fracture of titanium alloys following plane deformation is known to be ductile, the degree of ductility is determined by the critical stress intensity coefficient, while welded joints of titanium alloys have a low degree of plasticity, as a consequence of structural and phase transformations in the seam and within thermal influence zone. One known technique of ensuring high plasticity of the joint without loss of strength is annealing under low residual pressure at 900 deg C for 30 h. Joints produced by electron beam welding of VT6ch titanium alloy parts and annealed according to this technique were studied before and after fracture by an eccentric tensile load. Foils cut from seams and base metal were examined

under a UEMV-100BR electron microscope with an acceleration voltage of 100 kV and under a JSM-35 scanning electron microscope, respectively. The ductility of fracture was measured on 50-mm thick specimens according to the stress intensity criterion. A ductile fracture of joints whether annealed or not, with a serrate surface relief produced by intercrystalline fracture in annealed seams and caused by intracrystalline fracture in unannealed base metal is shown. Annealing at 900 deg C produces an apha-phase along grain boundaries in the seam. It is indicated that annealing reduces the yield strength and the ultimate strength of both seam and base metal only slightly, while it increase their percent elongation and percent reduction before fracture with the critical stress intensity index raised. E.A.K.

N85-12262# Joint Publications Research Service, Arlington, Va.
CAUSES OF STRENGTH REDUCTION IN WELDED TITANIUM-STEEL JOINTS Abstract Only **c39**
L. N. Larikov, M. N. Belyakova, A. A. Bibikin, V. N. Zmakov, and L. S. Kireyev *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 33 Transl. into ENGLISH from Avtomat. Svarka (Kiev), no. 4, Apr. 1984 p 17-29 and 22 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

Diffusion welding of VT1-O industrial-grade titanium to 2Khl3 ferritic steel or to 12Kh18N1OT austenitic steel under other than optimum conditions was found to produce joints of lower strength, even though they had the same phase composition. While the dependence of ultimate strength on welding time is almost the same for both titanium-steel pairs, the strength of titanium alone being reached by welding for less than 60 sec and not more than 200 sec, in a VT1-O/2Kh13 joint first titanium deforms and then the steel does but in a VT1-O/12Kh18N1OT joint only titanium deforms. During welding under pressure titanium macrode forms initially by twinning and slipping, followed by recrystallization at high strain levels. The lower strength of joints produced by prolonged welding at the optimum temperature and of joins produced by welding within the optimum time at a higher temperature of 800 C was investigated. In the first case, the strength of joints was found to be determined by the strain distribution and the cracking pattern following recrystallization. In the second case the strength reduction was found to be attributable to precipitation of complex carbides. R.S.F.

N85-12263# Joint Publications Research Service, Arlington, Va.
COMPACT WELDING APPARATUS WITH SOLAR POWER SUPPLY Abstract Only **c37**
In its USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 36 Transl. into ENGLISH from Rabochaya Gazeta (Kiev), 23 Aug. 1984 p 1 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

A compact device which Turkmen specialists developed is being used instead of bulky gas welding apparatus for welding girders. This device produces gas from ordinary water by utilizing the solar energy. A welder can now travel with only a small case to a place where he is called. The conversion of welding apparatus to a solar power supply has substantially simplified this apparatus and made it more efficient. Photoelectric converters generate direct current which is needed for the chemical reaction of breaking down water into oxygen and hydrogen. The current rectifier, which consumes a considerable amount of energy, is no longer needed. Two modifications of the welding apparatus were developed. They have a wide range of applications, from the installation of large metal structures to work on dental plates. R.S.F.

N85-12264# Joint Publications Research Service, Arlington, Va.
NEW WELDING EQUIPMENT FOR MECHANIZED WELDING AND TRENDS IN FURTHER DEVELOPMENT Abstract Only **c37**
A. I. Chvertko *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 37 Transl. into ENGLISH from Avtomat. Svarka (Kiev), no. 5, May 1984 p 50-56 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

New equipment for mechanized electric-arc welding includes series PDG semiautomatic welding machines, updated versions of A547U and A825M semiautomatic welding machines, seven modifications in series A200 welding machines for automatic assembly lines, and series AD small welding trucks with necessary attachments transportable manually by one operator. The main trends toward achieving higher productivity and better product quality are introduction of small-scale mechanization, standardization of labor saving equipment for semiautomatic and automatic welding stations, and eventual robotization. In the case of arc welding, the most critical operations are charging and discharging the machine, setting and guiding the electrode, and feeding the electrode, all of which is now increasingly done by program control. The complexity of welding equipment is increased by combining two or four arcs in one machine, for welding in row or in tandem of different part pairs of different sizes. Such multielectrode welding machines are treated as assembly lines or links in larger assembly lines. R.S.F.

N85-12265# Joint Publications Research Service, Arlington, Va.
LASER AND DIFFUSION WELDING EQUIPMENT R AND D Abstract Only **c37**
In its USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 39 Transl. into ENGLISH from Vecherniy Leningr. (Leningrad), 14 Apr. 1984 p 2 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

Activities of the department of specialized welding methods of the All-Union Scientific Research Institute of Electric Equipment are reported. The department is working on improving existing welding equipment and developing production processes and new welding machinery. It has developed 250 items of diffusion welding equipment alone. Original developments which are now in production include a series of machines for diffusion welding in a vacuum, for welding flexible copper buses, and for joining parts with large surfaces. Work on laser welding apparatus began a few years ago in the department. An industrial continuous laser unit with a power of 1.2 kilowatts was developed. New and more powerful laser units with programmed control have been developed. These units are said to be capable of welding, cutting, and heat-treating practically any metal and its alloys, and of producing almost invisible welds. R.S.F.

N85-12266# Joint Publications Research Service, Arlington, Va.
STUDY OF DEFORMATION AND FRACTURE OF AMg6N WELDABLE ALUMINUM ALLOY BY METHOD OF ACOUSTIC EMISSION Abstract Only **c39**
Tikhiy, D. G. Borshchevskaya, G. A. Bigus, T. Ya. Evina, and T. N. Bogomaz *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 40 Transl. into ENGLISH from Avtomat. Svarka (Kiev), no. 5, May 1984 p 9-12 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

Acoustic emission during deformation of the AMg6N weldable aluminum alloy was studied as a means of detecting flaws and fractures. Flat specimens 140 x 20 x 5 mm in size each had an artificially produced stress concentrator as an indicator of the fracture site. Examination of the fine structure was facilitated by chemical treatment of the surface with an etchant. An analysis of most highly stressed sections and averages of five microhardness readings revealed the evolution of the dislocation pattern and the buildup of defects. While the specimens were loaded in a universal tensile testing machine, acoustic emission signals were recorded by an IAS-3 instrument. A correlation is shown to exist between acoustic activity in this aluminum alloy and changes in its morphological as well as structure-sensitive characteristics during various stages of elastic-plastic deformation with attendant micro- and macro-fractures. R.S.F.

N85-12267# Joint Publications Research Service, Arlington, Va.
ELECTRIC WELDING INSTITUTE'S SPACE-TECHNOLOGY TEST RESULTS Abstract Only **c37**
T. Latina *In its* USSR Rept.: Mater. Sci. and Met.

(JPRS-UMS-84-007) 24 Oct. 1984 p 40-41 Transl. into ENGLISH from Vyshka (Baku), 28 Jul. 1984 p 2 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

The article comments on some of the space-technology developments of the Ukrainian Academy of Sciences' Institute of Electric Welding, including the multipurpose hand tool (URI) which cosmonauts onboard the orbiting station Salyut-7 used in welding and spray-coating operations in outer space. Mention is made of some of the facilities which are used to test space technology at this institute. These facilities include a large pressure chamber, which is intended for the testing of structural in conditions of a vacuum, and a testing-and-training-simulator unit. This unit is used to test the comfort of the upper parts of space suits during work with new welding tools in space conditions. Author

N85-12268# Joint Publications Research Service, Arlington, Va.
METALLURGY INSTITUTE'S DEVELOPMENTS FOR ALLOY AND AIRCRAFT PRODUCERS Abstract Only c26
Tengiz Sigua *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 47 Transl. into ENGLISH from Zarya Vostoka (Tbilisi, USSR), 4 Sep. 1984 p 2 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

Metallurgical processes developed for specific production facilities are described. One development involved a process for obtaining a silicomanganese-titanium alloy which is used to deoxidize steel. This process was introduced at the Rustavi Metallurgical Plant. Present plans call for the plant to expand its assortment of steels deoxidized with the silicomanganese-titanium alloy, and to begin supplying the alloy to other steelmakers. Results of the metallurgy institute's cooperation with the Zestafoni Ferroalloys Plant, which is said to be the country's only producer of refined ferromanganese, are also discussed. A process was developed for the purpose of expanding the plant's capacity for the production of this alloy without building a new shop. The new process increased the capacity of an electric furnace in an existing shop. The institute also took part in the development of a process for a new silicomanganese production facility that is under construction at the plant. The facility's first phase is scheduled for completion in 1986. The institute and the Aircraft Plant imeni Dimitrov have been doing important work on conserving scarce high-speed steels by recycling waste. In particular, the institute proposed a process for melting waste products that involves alloying with nitrogen. Author

N85-12269# Joint Publications Research Service, Arlington, Va.
REINFORCEMENT OF MOLYBDENUM DISILICIDE WITH NEMATIC CRYSTALS OF ALUMINUM OXIDE Abstract Only c24
G. I. Zakharova, S. S. Ordanyan, V. N. Paderno, G. N. Smolina, and Ye. S. Vinogradova *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 49 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Neorgan. Materialy (Moscow), v. 20, no. 7, Jul. 1984 p 1143-1147 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

The purpose of reinforcing MoSi2 with nematic Al2O3 crystals is to impart mechanical strength and thermal stability to the material with otherwise excellent characteristics, which include high heat resistance and high creep resistance as well as high electrical conductivity. In an experimental study of this problem Al2O3 whiskers with an approximately 1000:1 ratio of length to diameter and with 2.82 wt.% impurities were added to MoSi2 containing 1.42 wt.% impurities. Interaction of both materials produces SiO, Al2O, MoO2, Mo, Al vapors and Mo5Si3 condensate at processing temperatures within the 2000 to 2500 K range and Al(+), Al2O(+), SiO(+), Si(+), AlO(+) ions at processing temperatures within the 1700 to 2100 K range (according to mass-spectrometry). At 17000 K the corresponding ion currents begin to build up slowly to steady-state levels, as a result of interaction in the solid phase. Reinforcing was done by four methods: slag casting, pressing with subsequent sintering, hot pressing, and extrusion. Measurements of the mechanical strength and its temperature dependence revealed that extrusion yields the most satisfactory product. A tensile strength of 490 MPa in bending at room temperature was attained with 10 vol.% Al2O3 fibers. Author

N85-12270# Joint Publications Research Service, Arlington, Va.
SUPERPURE MATERIALS RESEARCH PLANNED Abstract Only c26
In its USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 51 Transl. into ENGLISH from Gudok (Moscow), 18 Aug. 1984 p 4 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

The Solntse research and production complex is described. This complex is under construction at an elevation of more than 1,000 meters above sea level in spurs of the Tyan'-Shan' Mountains, in Tashkent Oblast. There will be 62 heliostats each having an area of 50 square meters. They transmit hot rays to a concentrator's curved mirror (2,000 square meters). The concentrator will direct hundreds of kilowatts of energy to a special melting furnace. The complex is intended for obtaining materials which are super-refractory and at the same time superpure. Basic research in the fields of the utilization of solar energy and high-temperature and semiconductor physics will also be conducted here. Author

N85-12271# Joint Publications Research Service, Arlington, Va.
IMPROVED REINFORCEMENT METAL Abstract Only c26
O. Romaniv *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 52-53 Transl. into ENGLISH from Stroitelnaya Gazeta (Moscow), 26 Aug. 1984 p 3 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

Various research efforts to study the effects of heat treatment, chemical composition, and concrete additives on reinforcement metals are briefly described. In addition, a process for manufacturing a thickened polyethylene that is chemically and thermally stable by the method of electron radiation is discussed. Author

N85-12272# Joint Publications Research Service, Arlington, Va.
EFFECT OF OXIDIZING MEDIUM AND HEAT TREATMENT ON STOICHIOMETRY OF ZnSe CRYSTAL SURFACE Abstract Only c76
V. T. Sotnikov and S. S. Dobrotvorskiy *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 54 Transl. into ENGLISH from Poverkhnost: Fiz., Khim., Mekhan. (Moscow), no. 6, Jun. 1984 p 145-152 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

The chemical composition of ZnSe crystals at the surface after heat treatment under vacuum, without and with an oxidizing medium, was studied by both Auger electron spectroscopy and secondary ion mass spectroscopy. Heating without oxidation resulted in a higher surface concentration of Se atoms, these excess Se atoms being accompanied by Na, K, Li, Cs impurity atoms. Surface oxidation was effected plainly with commercial oxygen at room temperature, with traces of water vapor as well as with stimulation and intensification by electron bombardment. The spectra of Auger electrons and the kinetics of these spectra under the various conditions of heat treatment reveal intense oxidation and hydrolysis of the Zn Se surface, accompanied by a decrease of the Se surface concentration and an increase of the Zn surface concentration along with formation of ZnOH and Zn(OH)2 hydroxides indicated by the ion mass spectra. The spectra also indicate a thermomechanical mechanism of oxidation during electron bombardment. Author

N85-12273# Joint Publications Research Service, Arlington, Va.
DEPENDENCE OF MICROPLASTICITY OF BERYLLIUM ON GRAIN SIZE AND HEAT TREATMENT Abstract Only c26
I. I. Papirov, Ye. S. Karpov, G. F. Tikhinskiy, A. V. Vertkov, and I. G. Ivantsov *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 56 Transl. into ENGLISH from Fiz. Metallov i Metalloved. (Sverdlovsk, USSR), v. 57, no. 6,

Jun. 1984 p 1211-1213 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

Experiments were performed with specimens of cast high purity polycrystalline beryllium having a residual electrical resistivity corresponding to the ratio R(300K)/R(77K)=30. The stress-strain curves were plotted on the basis of high precision measurements with strain gauges under conditions of continuous loading or during loading unloading cycles with shrinking of the hysteresis loop. The results indicate that berryllium obeys the Hall-Petsch relation sigma=sigma + Kd(-1/2) between stress sigma and grain diameter d within the d = 10 to 77 micrometers range at all strain levels including epsilon = 2.10-7 at the microyield point. It departs from this relation as d approaches 143, insignificantly at high strain levels and increasingly so with decreasing strain level to a maximum deviation at epsilon = 2x10 to the -7 power. The coefficient K increases with increasing strain and sigma becomes negative as d is extrapolated to infinity. These anomalies are attributed to dissolution of impurities in high purity beryllium. The yield point is more sensitive to change in grain size than to change in composition and, at high annealing temperatures, depends also on parameters of the recrystallization process. Author

N85-12274# Joint Publications Research Service, Arlington, Va.
PRODUCING SEMICONDUCTOR MATERIALS BY SUPERFAST COOLING OF MELT Abstract Only c76
V. M. Glazov *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 60 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Neorgan. Materialy (Moscow), v. 20, no. 7, Jul. 1984 p 1238-1243 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

Superfast cooling of semiconductor melts makes it possible to achieve deep subcooling, which can result in either glass transition or diffusionless crystallization. Both effects, just as amorphization, can yield materials with anomalous structure and special properties. Both effects are analyzed from the standpoint of thermodynamics and demonstrated on Ge with quasi-binary systems (GaSb, GaAs, GaP, and InP). Melts cooled at rates of 10 to the 7th power to 10 to the 8th power K/s. Surface crystallization was effected in an atmosphere of pure argon. X-ray diffraction analysis revealed deviations from Vegard's law, positive in Ge-GaSb, Ge-GaAs negative in Ge-GaP, Ge-InP. The dependence of the lattice parameter on the state of metastable solid solutions is most probably attributable to a strong dissociation of the quasi-binary compound within corresponding ranges of its concentration, with subsequent formation of mixed substitutional and interstitial solid solutions. The feasibility of crystallization into a homogeneous solid solution in this case is demonstrated by Be2Te3-Bi2Se3 and Bi2Te3Sb2Te3 quasi-binary systems. Author

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N85-12275 Academy of Sciences of the Ukrainian SSR, Kharkov (USSR). Inst. of Radiophysics and Electronics.
MULTIELEMENT BEND DISCONTINUITIES IN OVERSIZE RECTANGULAR WAVEGUIDES
V. R. Litvinov and L. A. Rud 1982 37 p refs In RUSSIAN; ENGLISH summary
(Pr-200) Copyright. Avail: Issuing Activity

With the use of the semi-inversion method, strict mathematical models of H-plane, multi-element bend discontinuities in rectangular waveguides lacking basic restrictions on the amount of propagating waves are constructed. The effectiveness of the realized algorithms facilitates the study of a series of complex corner elements that may find application in the creation of circuits in oversized rectangular waveguides. Author

N85-12276 Academy of Sciences of the Ukrainian SSR, Kharkov (USSR). Inst. of Radiophysics and Electronics.
ON GENERATING FUNCTION OF WEBER PARABOLIC CYLINDER FUNCTIONS WITH A NEGATIVE INTEGER INDEX AND RADIO PULSE DEFORMATION BY A MEDIUM
A. M. Glutsyuk 1983 31 p refs In RUSSIAN; ENGLISH summary
(Pr-213) Copyright. Avail: Issuing Activity

A generating function for parabolic cylinder functions with a negative integer index is considered. The generating function is expressed as a contour integral depending on two complex variables. Asymptotic expressions are obtained, and value tables of this integral are given. Its role in the problem concerning one-dimensional propagation of an electromagnetic field is noted. The EM field was originally a radio pulse with the Gaussian envelope in the medium with anomalous dispersion. R.S.F.

N85-12277 Academy of Sciences of the Ukrainian SSR, Kharkov (USSR). Inst. of Radiophysics and Electronics.
THE INVESTIGATION OF SHORT WAVE SIGNAL STRUCTURE IN THE VICINITY OF THE CAUSTIC BY MEANS OF A HIGH-DIRECTED ANTENNA
P. V. Bliokh, V. G. Galushko, and Yu. M. Yampolsky 1982 25 p refs In RUSSIAN; ENGLISH summary
(Pr-194) Copyright. Avail: Issuing Activity

Variations in short-wave radio signals near the boundary of the dead zone were investigated at sunrise and sunset by means of a high-directed antenna of the radio telescope UTR-2. The angles of arrival of lower and upper rays and Doppler frequencies and amplitudes were measured. Within the framework of the parabolic model of the F region of the ionosphere, the inverse problem was solved by reconstructing the time dependence of the critical frequency. The field structure in the vicinity of the caustic was determined, and its velocity was established. The findings demonstrate that at periods of sunrise or sunset, the nonhomogeneous structure of the field in the vicinity of the caustic is displaced with a constant speed of several tens to several hundreds of meters per second. R.S.F.

N85-12278# Communications Research Centre, Ottawa (Ontario). DGSTA/DSS Branch.
SLIM TDMA ANIK B PILOT PROJECT
W. D. Hindson, W. J. Robertson, and R. C. Archard Jun. 1984 26 p refs
(CRC-Rept-1366) Avail: NTIS HC A03/MF A01

The technical and service feasibility of a 3 Mbps TDMA system was evaluated in a pilot project utilizing the ANIK B satellite. The organization and conduct of the project and its conclusions regarding the feasibility of light-route TDMA are summarized. Author

N85-12279# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ANALOG VOICE PROCESSING FOR FM TRANSMISSION IN A TELEPHONE CHANNEL [PROCESSAMENTO ANALOGICO DE VOZ PARA TRANSMISSAO FM DE UM CANAL TELEFONICO]
Naila Hoelz Colla and Fabio Violaro Jul. 1983 23 p refs In PORTUGUESE; ENGLISH summary Presented at the 35th Reuniao Anual da SBPC, 6-13 Jul. 1983, Belem/PA
(INPE-2798-PRE/359) Avail: NTIS HC A02/MF A01

A circuit for voice processing was designed to properly modify the audio signal in order to obtain a high signal-to-noise ratio with the least power consumption, by using companding and pre-emphasis/deemphasis. The compandor is formed by the compressor (at the transmission) and expander (at the reception). The compressor reduces the dynamic range of the speech signal power, which allows a more efficient utilization of the transmission bandwidth of the FM channel, enhancing both the signal-to-noise ratio of low signals and high signal crosstalk. The expander restores the original signal range and attenuates the intersyllabic and idle

channel noise. Deemphasis, at the reception, equalizes the noise throughout the channel bandwidth. To avoid overdeviation, there is a limiter which works jointly with the compressor as a fast AGC in order to avoid intermodulation. There may be pulsed E&M line signalization, transmitted by a 3825 Hz tone. The speech signal bandwidth is from 300 Hz to 3400 Hz. Author

N85-12280# Rome Air Development Center, Griffiss AFB, N.Y.
SCATTERING FROM SNOW BACKGROUNDS AT 35, 98, AND 140 GHz
D. T. Hayes, U. H. W. Lammers, and R. A. Marr Apr. 1984 67 p
(AD-A145798; RADC-TR-84-69) Avail: NTIS HC A04/MF A01 CSCL 20/14

Potentially, millimeter wave systems operating near terrain interact strongly with snow cover. The dependence of the millimeter-wave backscatter coefficient on physical snow parameters, such as metamorphic state and free-water content, were explored. The results complement a previous study done on dry slabs removed from snow cover (RADC-TR-81-88). Low-power CW scatterometers at frequencies of 35, 98, and 140 GHz allowed backscatter measurements on in-situ snow at vertical, horizontal, and crossed polarization. Backscatter coefficients reported here were obtained by averaging returns while the scatterometer antenna footprints swept over the snow in a continuous circular motion. Grazing angles on the surface, constant during a sweep, were parametrically changed from 90 deg to 45 deg to 15 deg. The measurements took place in March 1978, late during that winter, when the snow cover was usually melting during the day and refreezing during the night. Melting-water calorimetry provided the free-water data. The snow depth on the ground exceeded 30 cm. It was composed of layers ranging from fresh to almost month-old granular snow. Like-polarized backscatter coefficients of dry in-situ snow spread from a minimum of -12 dB at 35 GHz and 15-deg grazing angle to wellover 0 dB at all frequencies (8 dB at 140 GHz) at 90-deg grazing angle. The cross-polarized backscatter coefficient, following the same trend, ranged from a low of -16 dB at 35 GHz and 15 deg to a high of 4 dB at 140 GHz and 90 deg. GRA

N85-12281# Defence Research Establishment, Ottawa. (Ontario).
PRODUCTION OF OPTICALLY CORRELATED SEASAT-A (SEA SATELLITE) SAR (SYNTHETIC APERTURE RADAR) IMAGERY AT DREO (DEFENCE RESEARCH ESTABLISHMENT OTTAWA)
N. Brousseau and J. W. A. Salt Mar. 1984 25 p
(AD-A145970; DREO-TN-82-19) Avail: NTIS HC A02/MF A01 CSCL 17/9

Examples of optically-correlated imagery from the SEASAT-A Synthetic Aperture Radar are presented. A list of the imagery produced at DREO is included. Author (GRA)

N85-12282# Ohio State Univ., Columbus. Electroscience Lab.
ON AIRCRAFT ANTENNAS AND BASIC SCATTERING STUDIES Final Report
R. C. Rudduck, R. J. Marhefka, and W. D. Burnside 1 Jul. 1984 8 p
(Contract N62269-80-C-0384)
(AD-A146017; ESL-713303-4; NADC-84081-30) Avail: NTIS HC A02/MF A01 CSCL 20/14

This report summaries the work accomplished in each of two areas. The on-aircraft studies involved the GTD (Geometrical Theory of Diffraction) analysis of a strip scatterer in the near field of an antenna. In addition, a method for determining the aperture distribution of a linear array through near field measurements has been developed. The basic scattering studies portion attempts to provide an understanding of ray optical solutions and UTD (Uniform GTD) in particular for the analysis of scattering from basic shapes. Specific examples of scattering from plate models, composite cone frustrums and the near zone effects of a basic aircraft model are presented. GRA

N85-12283# Lincoln Lab., Mass. Inst. of Tech., Lexington.
WIDEBAND INTEGRATED VOICE/DATA TECHNOLOGY Semiannual Technical Summary Report, 1 Oct. 1983 - 31 Mar. 1984
C. J. Weinstein 31 Mar. 1984 27 p
(Contract F19628-80-C-0002; ARPA Order 3673; AF Proj. 3T10)
(AD-A146054; ESD-TR-84-018) Avail: NTIS HC A03/MF A01 CSCL 17/2

This report describes work performed on the Wideband Integrated Voice/Data Technology Program sponsored by the Information Processing Techniques Office of the Defense Advanced Research Projects Agency during the period 1 October 1983 through 31 March 1984. GRA

N85-12284# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
HEARING PROTECTION AND SPEECH INTELLIGIBILITY OF TWO NONSTANDARD INFLIGHT COMMUNICATION HEADSETS
A. M. Prohaska and C. W. Nixon Jul. 1984 27 p
(AF Proj. 7231)
(AD-A146110; AFAMRL-SR-84-504) Avail: NTIS HC A03/MF A01 CSCL 17/2

This study evaluated the hearing protection and voice communications effectiveness of two standard earmuff hearing protectors modified to function as voice communications headsets. Both modified units contained the AF standard H-143 inflight receivers and the M-87 noise cancelling boom microphone. Hearing protection and voice communication performance of the modified units were compared to those of the H-157 headset at four intensity levels of a noise spectrum that was generally flat from 63 Hz to 5000 Hz (80, 95, 105, 115 dB 20 microPa. The results showed that the H-157 headset provided more hearing protection than either of the modified headsets, especially in the higher frequencies. The modified headsets provided better speech intelligibility than the H-157 headset. Wearability problems were noted with the modified headsets which may become a problem in the operational situation. Author (GRA)

N85-12285# Illinois Univ., Urbana. Coordinated Science Lab.
SPREAD-SPECTRUM COMMUNICATIONS Final Report, 21 May 1978 - 20 Jun. 1984
M. B. Pursley and D. V. Sarwate 7 Aug. 1984 9 p
(Contract DAAG29-81-K-0064; Grant DAAG29-78-G-0114)
(AD-A146135; ARO-15492.15-EL; ARO-18103.18-EL) Avail: NTIS HC A02/MF A01 CSCL 09/4

This is the Final Report for Contract DAAG29-81-K-0064 (May 21, 1978-June 20, 1984) ARO Proposal 18103-EL), and the deferred Final Report for Grant DAAG29-78-G-0114 (May 21, 1978-May 20, 1981) (ARO Proposal 15492-EL). Our progress during a 6 year investigation of spread-spectrum systems is outlined. A list of publications is included. Author (GRA)

N85-12286# Lincoln Lab., Mass. Inst. of Tech., Lexington.
DISTRIBUTED SENSOR NETWORKS Semiannual Technical Summary Report, 1 Apr. - 30 Sep. 1983
R. T. Lacoss 30 Sep. 1983 52 p
(Contract F19628-80-C-0002)
(AD-A146209; ESD-TR-84-002) Avail: NTIS HC A04/MF A01 CSCL 09/2

The Distributed Sensor Networks (DSN) program is aimed at developing and extending target surveillance and tracking technology in systems that employ multiple spatially distributed sensors and processing resources. Such a system would be made up of sensors, data bases, and processors distributed throughout an area and interconnected by an appropriate digital data communication system. The detection, tracking and classification of low-flying aircraft has been selected to develop and evaluate DSN concepts in the light of a specific system problem. A DSN test bed has been developed and is being used to test and demonstrate DSN techniques and technology. The sensors presently in use are small arrays of microphones. The overall concept calls for a mix of sensor types. Visible TV sensors are scheduled for integration into the test bed in the near future. GRA

N85-12287# Rhode Island Univ., Kingston. Dept. of Mechanical and Applied Mechanics.
ANALYSIS OF IN-PLANE AND OUT-OF-PLANE GROUND MOTIONS USING THE BOUNDARY ELEMENT METHOD Final Report, 1 Jan. 1982 - 31 May 1984
M. H. Sadd and J. M. Rice Jul. 1984 87 p
(Contract DAAG29-82-K-0012)
(AD-A146229; ARO-18477.4-GS) Avail: NTIS HC A05/MF A01 CSCL 20/14

A completed research program is presented which has developed new computational methods to study geomechanics ground motions excited by subsurface sources. Both in-plane (plane strain) and out-of-plane (anti-plane strain) motions are investigated by employing a direct boundary element method within the framework of linear dynamic elasticity theory. The constructed boundary element method uses a time-dependent, half-space Green's function; thereby, eliminating the need to discretize the free surface, allowing the causality principle to reduce the number of required computations, and permitting an explicit time stepping scheme to be developed. The method is applicable for transient waves of general form propagating in an elastic half-space with arbitrary buried cavities. Numerical examples of both in-plane and out-of-plane problems are presented. Author (GRA)

N85-12288# Ballistic Research Labs., Aberdeen Proving Ground, Md.
RADIO TELEMETRY FORMULA APPLICATIONS. A PRACTICAL USERS GUIDE Final Memorandum Report
W. J. Cruickshank Aug. 1984 45 p
(DA Proj. 1L1-62618-AH-80)
(AD-A146247; AD-F300470; ARBRL-MR-03364) Avail: NTIS HC A03/MF A01 CSCL 17/2

The relationship between the various parameters of a frequency-modulated (FM) or double frequency-modulated (FM/FM) radio telemetry link and the resulting output signal-to-noise ratios are presented. Most of the relationships have been presented in varying degrees of applicability, but the purpose of this report is to present formulas that can be used as a quick reference for telemetry system designers. The mathematical derivation of all equations can be found in various radio telemetry and communications textbooks and papers. The basic radio frequency link transmission formula with a sample calculation is also presented. GRA

N85-12289# Defense Communications Engineering Center, Reston, Va.
DCS (DEFENSE COMMUNICATIONS SYSTEM) NETWORK SYNCHRONIZATION DESIGN CRITERIA
T. L. McCrickard, III 1 May 1984 89 p
(AD-A146251; DCEC-EP-3-83) Avail: NTIS HC A05/MF A01 CSCL 17/2

This publication describes the proposed network synchronization capability for the near-term Defense Communications System (DCS), and in particular the methodology for developing this capability. The basic network synchronization capability using existing technology, followed by major and minor transmission node implementations, are described. Finally, a detailed implementation plan for the DCS is given, with the admonition that the dynamic nature of timing and synchronization will cause update and revision of the plan. Author (GRA)

N85-12290# Rome Air Development Center, Griffiss AFB, N.Y.
ASPECTS AND APPLICATIONS OF SAR (SYNTHETIC APERTURE RADAR) IMAGERY FOR MENSURATION
S. J. Wheeler Mar. 1984 64 p
(AF Proj. 4594)
(AD-A146301; RADC-TR-84-54) Avail: NTIS HC A04/MF A01 CSCL 17/9

This document provides a brief introduction to those aspects of SAR image properties and signal processing operations related to the use of SAR images for point measurement purposes. Geometrical properties of the image and math models are considered. An analysis of problems which may be encountered in SAR measurement applications and potential research to solve these problems is addressed. Author (GRA)

N85-12291# Ecole Nationale Superieure des Telecommunications, Paris (France).
LINEAR INTERSECTING CODES
Gerard Cohen and Abraham Lempel (Technion, Haifa, Israel) Apr. 1984 15 p refs Presented at IEEE Intern. Symp. on Inform. Theory, St. Jovite, Canada, 26-30 Sep. 1983 Submitted for publication
(ENST-C-84002; ISSN-0751-1337) Avail: NTIS HC A02/MF A01

Pairs of binary linear codes C1(n,nR1), C2(n,nR2) with the property that any nonzero C1 is a member of the set C1 and C2 is a member of the set C2, there being a coordinate in which both C1 and C2 are nonzero, are studied. Results are applied to message synchronization in common channel communication. Author (ESA)

N85-12292# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. Systemes et Communications.
AUTOREGRESSIVE MODELING AND THE CLASSIFICATION OF LAND CLUTTER [MODELISATION AUTOREGRESSIVE ET CLASSIFICATION DE FOUILLIS DE SOLS]
Jean-Francois Agnel Apr. 1984 18 p refs In FRENCH Presented at Colloq. Intern. sur le Radar, Paris, 21-24 May 1984
(ENST-C-84003; ISSN-0751-1337) Avail: NTIS HC A02/MF A01

Spectral analysis of the radar signatures of three types of land was performed, based on autoregressive modeling and automatic classification. An airborne radar was used on plowed fields, forest and snow. A time sequence of 128 signatures composed a sample, and 1000 samples were recorded. A maximum entropy method was used for signal analysis. Comparison between the correlation coefficients and cepstral coefficients shows that in the latter case the recognition increases from 81% to 87.5% for all types of land and from 57% to 78% in the case of forest. Author (ESA)

N85-12293# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. Informatique.
STUDY ON THE CONVERSION AND TEST OF PROTOCOLS Ph.D. Thesis [ETUDE SUR LA CONVERSION ET LE TEST DE PROTOCOLS]
Yanghee Choi 6 Jun. 1984 132 p refs In FRENCH
(ENST-E-84005; ISSN-0751-1353) Avail: NTIS HC A07/MF A01

The conversion of protocols nonadapted to the open systems interconnection (OSI) architecture into compatibility with the OSI system and the test of the equipment for converting protocols are studied. Specification and validation of protocols are reviewed. The test of the X-21 procedure and the test of the signal management equipment, parts of the Telecom project, are analyzed. A specification method based on extended finite state machines is developed. A test system for protocol conversion equipment is described. Author (ESA)

N85-12294# Uppsala Ionospheric Observatory (Sweden).
OBSERVATIONS AND PROGNOSIS OF HF WAVE PROPAGATION VIA THE SPORADIC E LAYER
Harald Derblom Apr. 1984 32 p refs In SWEDISH; ENGLISH summary Presented at RVK 84, Linkoeping, Sweden
(Contract FOA-304176)
(UIO-SR-84-04; ISSN-0349-2699) Avail: NTIS HC A03/MF A01

Sporadic E propagation over a distance of 1000 km for 1 month was studied. Analysis of ionograms from a site close to the midpoint of the propagation path show that the median values of the maximum propagation observed (Es MOF) can be predicted accurately for daytime conditions. A great discrepancy between the observed and predicted values is reported for nightime. Es MOF exceeds the maximum usable frequency (EsMUF) by several MHz. The reflection mechanism is possibly different during the night. Comparison between maximum transmission frequencies calculated by ray tracing using full wave theory, and by the secant law shows marginal differences only. Refraction in layers

beneath the Es can be neglected in practical applications for EsMUF predictions. Author (ESA)

N85-12295# Forschungsinstitut der Deutschen Bundespost, Darmstadt (West Germany).
INFLUENCE OF STRUT CROSS-SECTION ON STRUT RADIATION OF REFLECTOR ANTENNAS
Volker Hombach Jun. 1984 43 p refs In GERMAN; ENGLISH summary
(FI-455-TBr-39) Avail: NTIS HC A03/MF A01

The sidelobe level of rotationally symmetric paraboloid antennas is studied. The influence of the strut cross-section on the scattering behavior was investigated. Results indicate that struts of circular and elliptical cross-section produce only a small scattered field in the backward region while lattice-type struts cause high-level sidelobes. Author (ESA)

N85-12296# Institute for Telecommunication Sciences, Boulder, Colo.
MODELING RAIN POLARIZATION EFFECTS TO MILLIMETER WAVE FREQUENCIES
E. J. Dutton and C. Samora Jun. 1984 34 p refs
(PB84-231042; NTIA/Rept-84/150) Avail: NTIS HC A03/MF A01 CSCL 20N

The attenuation of a received signal on a millimeter wave (above 30 GHz) link probably will be considerably more sensitive to transmitted polarization of the signal then is the case on a microwave (below 30 GHz) link. The introduction of this report gives some background on past theoretical developments in assessing rain polarization effects. Then, a model is developed to more readily assess the rain attenuation polarization dependency, and this new model is compared with an accepted theoretical model. It is concluded, based on three separate sets of comparisons, that the model gives results close enough to the theoretical model to warrant consideration for its future use. Author (GRA)

N85-12003# Joint Publications Research Service, Arlington, Va.
MINISTRY WANTS BETTER COMMO FACILITIES FOR AGROAVIATION
In its USSR Rept.: Transportation (JPRS-UTR-84-028) 4 Oct. 1984 Transl. into ENGLISH from Vozdushnyy Transp. (Moscow), 25 Aug. 1984 p 2 (For primary document see N85-12002 03-01)
Avail: NTIS HC A06/MF A01

N85-12216# Joint Publications Research Service, Arlington, Va.
MEASUREMENT OF SNOW COVER THICKNESS BY RADAR SOUNDING Abstract Only
V. V. Bogorodskiy and V. I. Poznyak *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 1 Transl. into ENGLISH from Z. Tek. Fiz. (Leningrad), v. 54, no. 5, May 1984 p 998-1000 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

N85-12217# Joint Publications Research Service, Arlington, Va.
DIFFRACTION OF PLANE ELECTROMAGNETIC WAVES ON SEMIINFINITE GRID OF PARALLEL CONDUCTORS ARRANGED AT ANGLE TO ITS EDGE Abstract Only
V. A. Rozov and S. A. Tretyakov *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 1-2 Transl. into ENGLISH from Radiotek. i Elektron. (Moscow), v. 29, no. 5, May 1984 p 856-865 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

N85-12218# Joint Publications Research Service, Arlington, Va.
RULES FOR POST-DETECTOR DETECTION OF WEAK SIGNALS IN NON-GAUSSIAN NOISE OF UNKNOWN POWER Abstract Only
Ya. Yu. Nikitin and R. P. Filimonov *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 2 Transl. into ENGLSH from Radiotek. i Electron. (Moscow), v. 29, no. 5, May 1984 p 914-919 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

N85-12220# Joint Publications Research Service, Arlington, Va.
POSSIBILITY OF REALIZATION OF HIGHLY-DIRECTIONAL ANTENNA ARRAYS Abstract Only
V. A. Pavlyuk, T. A. Sigova, M. A. Martynov, and V. P. Kismereshkin *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 3 Transl. into ENGLISH from Radiotek. i Electron. (Moscow), v. 29, no. 5 p 990-991 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

N85-12221# Joint Publications Research Service, Arlington, Va.
SCATTERING OF RADIO WAVES ON MAGNITIZED METEOR TRAIL Abstract Only
V. V. Sidorov and R. G. Khuzyashev *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 5 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved. Radiofiz. (Gorky, USSR), v. 27, no. 5, May 1984 p 661-664 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

N85-12230# Joint Publications Research Service, Arlington, Va.
MEASUREMENTS OF POLARIZATION CHARACTERISTICS OF RADIATION FIELD OF ON-BOARD AIRCRAFT ANTENNAS Abstract Only
E. D. Gazazyan and V. G. Panchenko *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 28 Transl. into ENGLISH from Metrologiya (Moscow), no. 6, Jun. 1984 p 44-49 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

N85-12231# Joint Publications Research Service, Arlington, Va.
SPECTRAL NOISE DENSITY AND RANDOM ERRORS OF PULSE FREQUENCY CHARACTERISTIC METERS Abstract Only
A. V. Purtov and Ye. V. Krsheminskaya *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 29 Transl. into ENGLISH from Metrologiya (Moscow), no. 6, Jun. 1984 p 50-54 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

N85-12232# Joint Publications Research Service, Arlington, Va.
NONLINEAR ELECTROMAGNETIC WAVES IN FERROMAGNETIC CONDUCTING MEDIA Abstract Only
F. G. Bass and N. N. Nasonov *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 30 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorky, USSR), v. 27, no. 5, May 1984 p 642-654 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

N85-12233# Joint Publications Research Service, Arlington, Va.
NUMERICAL INVESTIGATION OF DIFFRACTION MODELS OF MICROWAVE INTEGRATED CIRCUITS Abstract Only
V. V. Nikolskiy and T. I. Nikolskaya *In its* USSR Rept.: Electron and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 32 Transl. into ENGLISH from Izv. Vyssh. Zaved.: Radiofiz. (Gorky, USSR), v. 27, no. 5 p 669-674 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

N85-12234# Joint Publications Research Service, Arlington, Va.
GENERATION OF SUPERPOWERFUL MICROSECOND ELECTROMAGNETIC RADIATION PULSES Abstract Only
S. P. Bugayev, V. I. Kanavets, A. I. Klimov, V. I. Koshelev, P. A. Khryapov, and V. A. Cherepenin *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 32-33 Transl. into ENGLISH from Rasiotek. i Eletrotek. (Moscow), v. 29, no. 5, May 1984 p 994-996 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

N85-12235# Joint Publications Research Service, Arlington, Va.
SCATTERING OF ELECTROMAGNETIC WAVES IN FLAT WAVEGUIDE WITH BILATERAL DIAPHRAGMS Abstract Only
V. D. Lukyanov and G. L. Nikitin *In its* USSR Rept.: Electron.

and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 33-34 Transl. into ENGLISH from Z. Tek. Fiz. (Leningrad), v. 54, no. 5, May 1984 p 865-872 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

N85-12423# European Space Agency, Paris (France). Earthnet.
THE CURRENT FORMAL STATUS OF THE ERS-1 GROUND SEGMENT
G. Paci *In its* ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 23-28 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

N85-12429# University Coll., London (England). Dept. of Electronic and Electrical Engineering.
SPECIAL DIFFICULTIES OF RETRIEVING SURFACE ELEVATION OVER CONTINENTAL ICE
H. D. Griffiths *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 61-65 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

N85-12451# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
ERS-1 RADAR ALTIMETER SYSTEM PERFORMANCE EVALUATION AND CALIBRATION
H. M. Braun, H. Groebke, and P. Hans *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 181-186 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

N85-12297 Academy of Sciences of the Ukrainian SSR, Kharkov (USSR). Inst. of Radiophysics and Electronics.
DRG THEORY ON THE BASIS OF A DISCRETE INTERACTION MODEL
Yu. I. Evdokimenko, K. A. Lukin, and B. K. Skrynnick 1983 37 p refs In RUSSIAN; ENGLISH summary
(Pr-215) Copyright. Avail: Issuing Activity

A general variant of the linear theory of cascade grouping is proposed, and a nonlinear theory of the diffraction radiation generator (DRG) is developed on the basis of a discrete interaction model. All relations of the linear theory are obtained using integral Fourier transformations. Working characteristics obtained by the wave model and discrete interaction model are compared. The equations obtained for interaction power permit limiting transitions to wave model equations as well as to known approximate equations derived within the framework of the discrete interaction model. The most important result of the theory of cascade grouping consists in the development of the analytically nonlinear DRG theory. The obtained model can be used effectively to calculate the essential characteristic of an instrument without numerical integration of motion equations. R.S.F.

N85-12298 Academy of Sciences of the Ukrainian SSR, Kharkov (USSR). Inst. of Radiophysics and Electronics.
FORCED OSCILLATIONS THEORY FOR RESONANT EXTENDED INTERACTION ELECTRON DEVICES
D. M. Vavriv and O. A. Tretyakov 1982 51 p refs In RUSSIAN; ENGLISH summary
(Pr-206) Copyright. Avail: Issuing Activity

The problem of forced oscillation excitation in resonant systems having extended interaction of electrons with a resonator field is considered. A nonlinear autonomic differential equation system of the first order for macroscopic oscillation amplitude and phase with amplitude uniform initial condition is obtained. It is shown that in such a nonlinear oscillation system of generalized Thompson type with nonlinearity of rather common kind, two stationary states of different types can exist. The amplification mode of operation is thoroughly studied, vis a vis the case in which beam current is smaller than auto-oscillation threshold current. Linear and nonlinear analytic amplification mode theories are developed, their limits of application are determined, and exact numerical calculation results are presented. Transition processes are also studied. Theoretical results indicate vast prospects for creating such amplifiers in the millimeter wave band. R.S.F.

N85-12299*# Martin Marietta Aerospace, Denver, Colo.
POWER SUBSYSTEM AUTOMATION STUDY Final Report
John C. Tietz, David Sewy, Cynthia Pickering, and Ronald Sauers Sep. 1984 207 p refs
(Contract NAS8-34938)
(NASA-CR-171213; NAS 1.26:171213; MCR-84-596) Avail: NTIS HC A10/MF A01 CSCL 09E

The purpose of the phase 2 of the power subsystem automation study was to demonstrate the feasibility of using computer software to manage an aspect of the electrical power subsystem on a space station. The state of the art in expert systems software was investigated in this study. This effort resulted in the demonstration of prototype expert system software for managing one aspect of a simulated space station power subsystem. B.W.

N85-12300*# TRW Electronic Systems Group, Redondo Beach, Calif.
THE 30 GHz SOLID STATE AMPLIFIER FOR LOW COST LOW DATA RATE GOUND TERMINALS Final Report, Jun. 1982 - Jun. 1984
Y. C. Ngan and M. A. Quijije Sep. 1984 189 p
(Contract NAS3-23266)
(NASA-CR-174795; NAS 1.26:174795; Rept-4-9-T-10-F) Avail: NTIS HC A09/MF A01 CSCL 09C

This report details the development of a 20-W solid state amplifier operating near 30 GHz. The IMPATT amplifier not only met or exceeded all the program objectives, but also possesses the ability to operate in the pulse mode, which was not called for in the original contract requirements. The ability to operate in the pulse mode is essential for TDMA (Time Domain Multiple Access) operation. An output power of 20 W was achieved with a 1-dB instantaneous bandwidth of 260 MHz. The amplifier has also been tested in pulse mode with 50% duty for pulse lengths ranging from 200 ns to 2 micro s with 10 ns rise and fall times and no degradation in output power. This pulse mode operation was made possible by the development of a stable 12-diode power combiner/amplifier and a single-diode pulsed driver whose RF output power was switched on and off by having its bias current modulated via a fast-switching current pulse modulator. Essential to the overall amplifier development was the successful development of state-of-the-art silicon double-drift IMPATT diodes capable of reproducible 2.5 W CW output power with 12% dc-to-RF conversion efficiency. Output powers of as high as 2.75 W has been observed. Both the device and circuit design are amenable to low cost production. B.W.

N85-12301# General Electric Co., Schenectady, N. Y.
NOVEL TECHNIQUES FOR THE FABRICATING AND CHARACTERIZATION OF GaAs MIS (METAL INSULATOR SEMICONDUCTOR) STRUCTURES Final Report, 1 Jan. 1983 - 29 Feb. 1984
R. S. Ehle, W. G. Morris, and B. J. Baliga Jun. 1984 26 p
(Contract F49620-83-C-0031)
(AD-A145766; SRD-84-1001; AFOSR-84-0780TR) Avail: NTIS HC A03/MF A01 CSCL 09/1

Organometallic chemical vapor deposition (OMCVD) of Al2O3 on GaAs has been investigated as a means of fabricating metal-insulator-semiconductor field effect transistors (MISFET). Deposition at temperatures less than 400C forms high-quality films of Al2O3. Diffusion can alter the composition during high-

temperature anneals. In-situ etching of the GaAs just prior to depositing the Al2O3 markedly reduced surface generation velocities, but inversion at the interface was not conclusively demonstrated. Author (GRA)

N85-12302# Denver Research Inst., Colo. Social Systems Research and Evaluation Div.
TRAINING CAPABILITIES TEST OF ELECTRONICS EQUIPMENT MAINTENANCE TRAINER (EEMT): FINDINGS AND CONCLUSIONS Final Technical Report, Sep. 1981 - Feb. 1984
L. F. Cicchinelli, R. A. Keller, and K. R. Harmon Orlando, Fla. Naval Training Equipment Center Jul. 1984 125 p
(Contract N61339-81-C-0126)
(AD-A146075; TAEG-TR-158) Avail: NTIS HC A06/MF A01 CSCL 05/9

The objective of the study was to design and conduct a Training Capabilities Test (TCT) of the Electronic Equipment Maintenance Trainer (EEMT) within the Primary Power portion of the AN/SPS-10 radar training course at ET A School, Naval Training Center, Great Lakes. The TCT consisted of a series of studies which examined the training effectiveness, operational suitability, and life cycle cost of the EEMT as it supports the training system. Author (GRA)

N85-12303# Rome Air Development Center, Griffiss AFB, N.Y.
ACCELERATED STRESS FACILITY 1976-1983 Report, 1976 - 1983
R. A. Blore Mar. 1984 59 p
(AF Proj. 2338)
(AD-A146101; RADC-TM-84-6) Avail: NTIS HC A04/MF A01 CSCL 09/3

The complexities of the electronics on which we will perform reliability assessments can only be achieved through automation. Likewise, the complexities of the reliability assessment can only be met through automation. We must be smart in what failure mechanisms to expect, where to expect them, when to expect them, how to stress for them, and how to recognize them when they occur. We must be smart in what we are looking for, what data we gather, and how we analyze that data. We must be smart in how we specify the devices. We must automate the whole reliability characterization process. The publication documents the developments that have taken place in the RADC/RBRP Accelerated Stress Facility (ASF) for the years 1976 through 1983. Section 2 highlights the modifications which took the ASF from primarily static bias to dynamic exercise capability. Section 3 deals with the automation of the stress tests utilizing evaluation kits through a network of microcomputers. It is through this work that the necessity and some of the potentials of automating the reliability characterization process and specifically the stress testing portion have been realized as well as some of the practical aspects of implementing such. Most importantly, Section 4 addresses some of those potential applications of automation which will be possible because of the incorporation of computers in the testing process. GRA

N85-12304# Massachusetts Inst. of Tech., Cambridge. Dept. of Chemistry.
CHEMICAL DERIVATIZATION OF AN ARRAY OF THREE GOLD MICROELECTRODES WITH POLYPYRROLE: FABRICATION OF A MOLECULE-BASED TRANSISTOR Interim Technical Report
H. S. White, G. P. Kittlesen, and M. S. Wrighton 10 Sep. 1984 14 p
(Contracts N00014-84-K-0553; N00014-84-K-0291)
(AD-A146221; TR-1-ONR) Avail: NTIS HC A02/MF A01 CSCL 09/1

This document reports the fabrication of a chemically derivatized microelectrode array that can function as a transistor when immersed in an electrolyte solution. The key finding is that a small signal (charge) needed to turn on the device can be amplified. The device to be described mimics the fundamental characteristics of solid state transistor, since the resistance between to contacts can be varied by a signal to be amplified. The chemical transistor is the set of three (drain, gate, and source) Au microelectrodes covered by polypyrrole. GRA

N85-12305# Texas Univ., Austin. Dept. of Electrical Engineering.
COPLANAR SCHOTTKY VARIABLE PHASE SHIFTER
Y. Fukuoka and T. Itoh 13 Aug. 1984 91 p
(Contract N00014-79-C-0553)
(AD-A146304; UT-MW-N-84-6) Avail: NTIS HC A05/MF A01 CSCL 09/5

A coplanar Schottky variable phase shifter is studied. This device has a simple configuration and is suitable for monolithic integration. The device uses the electronic variability of the depletion layer thickness of the Schottky contact under the coplanar waveguide to change the amount of the phase shift. A periodic structure is introduced to reduce a loss caused by the existing semiconductor material which has a finite conductivity. An integral equation is formulated and solved by the point-matching method. The analysis allows one to predict the phase shift the attenuation in the device. It is shown that such a device can operate at millimeter-wave frequencies with a very small loss. A simple measurement confirmed these predictions. Author (GRA)

N85-12306# Southeastern Center for Electrical Engineering Education, Inc., St. Cloud, Fla.
BASIC EMC (ELECTROMAGNETIC COMPATIBILITY) TECHNOLOGY ADVANCEMENT FOR C3 SYSTEMS, MACROMODELING OF DIGITAL CIRCUITS, VOLUME 2B Final Report, Jun. 1981 - Sep. 1983
J. C. Bowers and R. S. Vogelsong Griffiss AFB, N.Y. RADC Apr. 1984 124 p
(Contract F30602-81-C-0062)
(AD-A146333; RADC-TR-82-286-Vol-2B) Avail: NTIS HC A06/MF A01 CSCL 09/5

A NAND gate macro-model is developed using SPICE which allows for the complete simulation of the operation of the logic gate. The model derivation requires only external dc voltage and current measurements and logic delay times, but the model developed is shown to fully simulate the high-frequency response of the device as well, including the response of the device to interference in the 1-100 MHz range. A simpler SUPER*SCEPTRE NAND gate model is also presented, which effectively models the response up to normal switching speed limits. Also, a less complex SPICE modeling procedure is developed for the purpose of modeling large logic circuits in a minimum of computer time. GRA

N85-12307# Los Alamos Scientific Lab., N. Mex.
ELECTROCHEMICAL AND SURFACE SCIENCE RESEARCH ON FUEL CELLS Progress Report, 1 Jan. - 31 Dec. 1982
S. Srinivasan, E. R. Gonzalez (Inst. de Fisica e Quimica de Sao Carlos, Brazil), K. L. Hsueh (Clarkson Coll., Potsdam, N.Y.), D. T. Chin, P. J. Hyde, C. J. Maggiore, S. Gottesfeld (Tel-Aviv Univ., Israel), H. R. Chang (Clarkson Coll., Potsdam, N.Y.), C. R. Derouin, and R. E. Bobbett Jun. 1984 63 p refs
(Contract W-7405-eng-36)
(DE84-015982; LA-10008-PR) Avail: NTIS HC A04/MF A01

The development of advanced acid electrolyte fuel cells for power generation and transportation application is investigated. The ions CF3SO3(-) and H2PO4(-) have similar adsorption characteristics on mercury from dilute aqueous electrolytes (< 1 M). Transport properties in phosphoric acid show strong temperature and concentration dependences. Solvent clusters account for transport of 6 to 9 moles of water per mole of proton through Nafion membranes. Exchange current densities for oxygen reduction on platinum are dependent on anion adsorption from the electrolyte. The nuclear microprobe technique reveal: (1) the three-dimensional distribution of platinum in a fuel cell electrode, and (2) the loss of vanadium from a Pt-V electrocatalyst during fuel cell operation. The ellipsometric method was developed to measure anion adsorption on platinum. Single cells were assembled and tested for the proposed simulated drive-cycle-performance evaluations. An energy balance was made for a 20 kW phosphoric acid fuel cell power plant for a GM X-car. DOE

N85-12308# National Bureau of Standards, Washington, D.C. Center for Electronics and Electrical Engineering.
CENTER FOR ELECTRONIC AND ELECTRICAL ENGINEERING TECHNICAL PROGRESS BULLETIN, JANUARY - MARCH 1983, NO. 2
J. F. Mayo-Wells, comp. Jun. 1984 17 p refs (PB84-231224; NBSIR-84/2857/1) Avail: NTIS HC A02/MF A01 CSCL 09C

Abstracts covering the work of the National Bureau of Standards Center for Electronics and Electrical Engineering are presented. Topics include semiconductor metrology, signal processing and transmission metrology, power systems metrology, superconductors, and electromagnetic interference. Approximately 38 citations of published papers and papers approved for publication are presented. M.G.

N85-12193# Joint Publications Research Service, Arlington, Va.
SWISS FIRM IMPROVES METHOD FOR SOLDERING PRINTED CIRCUITS
J. P. Feste *In its* West Europe Rept.: Sci. and Technol., No. 166 (JPRS-84845) 30 Nov. 1983 p 30-31 Transl. into ENGLISH from Electron. Actualites (Paris), 7 Oct. 1983 p 1; 17 (For primary document see N85-12190 03-31)
Avail: NTIS HC A05/MF A01

N85-12194# Joint Publications Research Service, Arlington, Va.
INTEGRATED CIRCUITS, MBM'S, FORM FOCUS OF WORK AT FRENCH LETI
In its West Europe Rept.: Sci. and Technol., No. 166 (JPRS-84845) 30 Nov. 1983 p 33-35 Transl. into ENGLISH from Electron. Actualites (Paris), 7 Oct. 1983 p 10 (For primary document see N85-12190 03-31)
Avail: NTIS HC A05/MF A01

N85-12196# Joint Publications Research Service, Arlington, Va.
PROBLEMS IN CEMA MICROELECTRONIC COOPERATION NOTED
Jan Grzybowski and Jerzy Kusinski *In its* East Europe Rept.: Sci. Affairs, No. 791 (JPRS-84624) 26 Oct. 1983 p 1-10 Transl. into ENGLISH from Hiradastech. (Budapest), no. 4, 1983 p 160-164 (For primary document see N85-12195 03-31)
Avail: NTIS HC A07/MF A01

N85-12237# Joint Publications Research Service, Arlington, Va.
CIRCUIT ENGINEERING AND TECHNOLOGICAL OPTIMIZATION OF VERY HIGH SPEED LSI LOGIC ELEMENTS AND TRANSISTOR STRUCTURES Abstract Only
A. N. Bubennikov *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 38 Transl. into ENGLISH from Mikroelektron. (Moscow), v. 13, no. 4, Jul. - Aug. 1984 p 367-375 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

N85-12238# Joint Publications Research Service, Arlington, Va.
CALCULATION OF ENERGY CHARACTERISTICS OF DOUBLE-PASSAGE AMPLIFIER Abstract Only
A. A. Betin, A. I. Dyatlov, S. N. Kulagina, S. V. Kulagin, N. D. Milovskiy, and V. Ya. Sherstobitov *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 49 Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved.: Radiofiz. (Gorky, USSR), v. 27, no. 5, May 1984 p 557-564 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

N85-12239# Joint Publications Research Service, Arlington, Va.
FREQUENCY SHIFTING IN MULTIMODE FIBER OPTIC PHASE MODULATION DEVICES Abstract Only
V. Yu. Petrunkin, O. I. Kotov, and V. N. Filippov *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 49-50 Transl. into ENGLISH from Z. Tek. Fiz. (Leningrad), v. 54, no. 5, May 1984 p 955-957 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

N85-12240# Joint Publications Research Service, Arlington, Va.
EFFICIENCY OF PHOTOELECTRIC CONVERSION OF SHORT RADIATION PULSES Abstract Only
V. D. Rumyantsev and N. M. Saradzhisvill *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 50 Transl. into ENGLISH from Z. Tek. Fiz. (Leningrad), v. 54, no. 5, May 1984 p 979-982 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N85-12309 Colorado State Univ., Fort Collins.
VORTICITY AMPLIFICATION IN VISCOUS FLOW AROUND A BODY Ph.D. Thesis
Peter Patrick Sullivan 1984 284 p
Avail: Univ. Microfilms Order No. DA8417123

A mathematical model of turbulence amplification in flow approaching the stagnation zone of a bluff body incorporating the viscous effects is advanced. The model examines the amplification and/or attenuation of steady and unsteady vortical disturbances as they are conveyed from a finite upwind distance to the stagnation point. In particular, the analysis focuses on the evolution of cross vorticity and streamwise perturbation velocity along the stagnation streamline. The linearized governing equations are solved simultaneously by dividing the flow into inner and outer regions for both the cross vorticity and streamwise perturbation velocity. Asymptotic solutions are put forward in the outer region while in the inner region the equations are solved numerically. An iterative numerical matching procedure was devised to achieve simultaneous matching for both perturbation variables. Dissert. Abstr.

N85-12310 Minnesota Univ., Minneapolis.
INTERNAL HEAT TRANSFER AND PRESSURE DROP MEASUREMENTS IN A VARIOUSLY BAFFLED SHELL AND TUBE HEAT EXCHANGER Ph.D. Thesis
Perez Galindo 1984 347 p
Avail: Univ. Microfilms Order No. DA8418475

Heat transfer coefficients, pressure distributions, and fluid flow patterns on the shell side of shell and tube heat exchangers are discussed. The main focus was to quantify the effect of the size of the baffle window on the heat transfer coefficient, which was measured at each tube in the bundle and at three Reynolds numbers. Pressure drops were obtained by measuring detailed pressure distributions within the exchangers. The flow visualizations provided fluid flow patterns adjacent to the shell wall, to the baffle plates, and at each tube of the array. Performance comparisons among the exchangers were carried out holding the heat transfer surface area fixed together with either the pumping power, the mass flow rate, or the pressure drop. Numerical evaluations of commonly employed design procedures are presented using the present data as a means for rank ordering their validity. Tinker's design method provided the best predictions of the present heat transfer and pressure drop results, which are unaffected by leakage and bypass. Dissert. Abstr.

N85-12311 Cornell Univ., Ithaca, N.Y.
SECOND ORDER MODELING OF SCALAR TURBULENT FLOWS Ph.D. Thesis
Tsan-Hsing Shih 1984 130 p
Avail: Univ. Microfilms Order No. DA8415336

Turbulent flows with scalars (temperature or mass fraction) are studied. In modeling homogeneous passive scalar fluctuations and the thermal mixing layer a model for the pressure scrambling (or return) term is developed based on realizability. In modeling

the variable density mixing layer a conventional averaging method is used. All models in the second moment equations are re-examined. A modified model for the scalar dissipation equation is tested. A modified Patankar-Spalding numerical method for stability is developed. A set of simplified algebraic equations for second moments are proposed and their solutions are compared with one from the full equations. A set of consistent models for the Reynolds stress and scalar flux equations are formed, based on various general relizability and consistency principles. All calculations are in good or reasonable agreement with experimental data. Dissert. Abstr.

N85-12312 Admiralty Marine Technology Establishment, Teddington (England).
FLUID LAYER BETWEEN INFINITE ELASTIC PLATES II. DISTRIBUTION OF POWER FLOW
J. H. James Mar. 1984 12 p refs
(AD-A146690; AMTE(N)-TM-84058-Pt-2; BR92462) Avail: NTIS HC A02/MF A01

Formulas for the numerical evaluation of the separate power flows in plates and fluid due to line-force and line-source excitation are given. Plots of power flow show significant interchange of energy between plates and fluid. Author (ESA)

N85-12313*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EXPERIMENTAL AND PREDICTED HEATING DISTRIBUTIONS FOR BICONICS AT INCIDENCE IN AIR AT MACH 10
Charles G. Miller, III Nov. 1984 118 p refs
(NASA-TP-2334; L-15785; NAS 1.60:2334) Avail: NTIS HC A06/MF A01 CSCL 20D

Heating distributions were measured on a 1.9-percent-scale model of a generic aeroassisted vehicle proposed for missions to a number of planets and for use as a moderate lift-drag ratio Earth orbital transfer vehicle. This vehicle is spherically blunted, 12.84 deg/7 deg biconic with the fore-cone bent upward 7 deg to provide self-trim capability. A straight biconic with the same nose radius and the same half-angles was also tested. The free-stream Reynolds numbers based on model length were equal to about 2 x 10(5) or 9 x 10 (5). The angle of attack, referenced to the aft-cone, was varied from 0 deg to 20 deg. Heating distributions predicted with a parabolized Navier-Stokes (PNS) code are compared with the measurements for the present Reynolds numbers and range of angles of attack. Leeward heating was greatly affected by Reynolds number, with the heating increasing with decreasing Reynolds number for attached flow (low incidence). The opposite was true for separated flow, which occurred when the fore-cone angle of attack exceeded 0.8 times the fore-cone half-angle. Windward heating distributions were predicted to within 10 percent with the PNS code. Leeward heating distributions were predicted qualitatively for both Reynolds numbers, but quantitative agreement was poorer than on the windward side. M.G.

N85-12314*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
VORTEX-GENERATING COOLANT-FLOW-PASSAGE DESIGN FOR INCREASED FILM-COOLING EFFECTIVENESS AND SURFACE COVERAGE
S. Stephen Papell Nov. 1984 24 p refs
(NASA-TP-2388; E-2147; NAS 1.60:2388) Avail: NTIS HC A02/MF A01 CSCL 20D

The thermal film-cooling footprints observed by infrared imagery for three coolant-passage configurations embedded in adiabatic-test plates are discussed. The configurations included a standard round-hole cross section and two orientations of a vortex-generating flow passage. Both orientations showed up to factors of four increases in both film-cooling effectiveness and surface coverage over that obtained with the round coolant passage. The crossflow data covered a range of tunnel velocities from 15.5 to 45 m/sec with blowing rates from 0.20 to 2.05. A photographic streakline flow visualization technique supported the concept of the counterrotating apability of the flow passage design and gave visual credence to its role in inhibiting flow separation. M.G.

N85-12315*# Texas A&M Univ., College Station. Dept. of Mechanical Engineering.
HEAT TRANSFER AND PRESSURE DROP IN BLADE COOLING CHANNELS WITH TURBULENCE PROMOTERS Final Report
J. C. Han, J. S. Park, and C. K. Lei Washington NASA Nov. 1984 156 p refs
(DA Proj. 1L1-62209-AH-76)
(NASA-CR-3837; E-2249; NAS 1.26:3837) Avail: NTIS HC A08/MF A01 CSCL 20D

Repeated rib roughness elements have been used in advanced turbine cooling designs to enhance the internal heat transfer. Often the ribs are perpendicular to the main flow direction so that they have an angle-of-attack of 90 deg. The objective of the project was to investigate the effect of rib angle-of-attack on the pressure drop and the average heat transfer coefficients in a square duct with two opposite rib-roughned walls for Reynolds number varied from 8000 to 80,000. The rib height-to-equivalent diameter ratio (e/D) was kept at a constant value of 0.063, the rib pitch-to-height ratio (P/e) was varied from 10 to 20, and the rib angle-of-attack (alpha) was varied from 90 deg to 60 deg to 45 deg to 30 deg respectively. Two types of entrance conditions were examined, namely, long duct and sudden contraction. The heat transfer coefficient distribution on the smooth side wall and the rough side wall at the entrance and the fully developed regions were measured. Thermal performance comparison indicated that the pumping power requirement for the rib with an oblique angle to the flow (alpha = 45 deg to 30 deg) was about 20 to 50 percent lower than the rib with a 90 deg angle to the flow for a given heat transfer duty. B.W.

N85-12316*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
NUMERICAL STUDIES OF UNSTEADY TRANSONIC FLOW OVER AN OSCILLATING AIRFOIL
W. J. Chyu and S. S. Davis Oct. 1984 25 p refs
(NASA-TM-86011; A-9857; NAS 1.15:86011) Avail: NTIS HC A02/MF A01 CSCL 20D

A finite-difference solution to the Navier-Stokes equations combined with a time-varying grid-generation technique was used to compute unsteady transonic flow over an oscillating airfoil. These computations were compared with experimental data (obtained at Ames Research Center) which form part of the AGARD standard configuration for aeroelastic analysis. A variety of approximations to the full Navier-Stokes equations was used to determine the effect of frequency, shock-wave motion, flow separation, and airfoil geometry on unsteady pressures and overall air loads. Good agreement is shown between experiment and theory with the limiting factor being the lack of a reliable turbulence model for high-Reynolds-number, unsteady transonic flows. Author

N85-12317*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE STRUCTURE OF THE VORTICITY FIELD IN TURBULENT CHANNEL FLOW. PART 2: STUDY OF ENSEMBLE-AVERAGED FIELDS
John Kim and Parviz Moin Oct. 1984 41 p refs 2 Vol.
(NASA-TM-86657; Rept-85014; NAS 1.15:86657) Avail: NTIS HC A03/MF A01 CSCL 20D

Several conditional sampling techniques are applied to a data base generated by large-eddy simulation of turbulent channel flow. It is shown that the bursting process is associated with well-organized horseshoe vortices inclined at about 45 deg. to the wall. These vortical structures are identified by examining the vortex lines of three-dimensional, ensemble averaged vorticity fields. Two distinct horseshoe-shaped vortices corresponding to the sweep and ejection events are detected. These vortices are associated with high Reynolds shear stress and hence make a significant contribution to turbulent energy production. The dependency of the ensemble averaged vortical structures on the detection criteria, and the question of whether this ensemble-averaged structure is

an artifact of the ensemble averaging process are examined. The ensemble-averaged pattern of these vortical structures that emerge from the analysis could provide the basis for a hypothetical model of the organized structures of wall-bounded shear flows. Author

N85-12318*# Rocketdyne, Canoga Park, Calif. Advanced Booster Propulsion Systems.
METHANE HEAT TRANSFER INVESTIGATION Technical Progress Narrative, 15 Aug. - 31 Oct. 1984
Ronald T. Cook 1 Nov. 1984 23 p
(Contract NAS8-34977)
(NASA-CR-171199; NAS 1.26:171199; ASR84-72) Avail: NTIS HC A02/MF A01 CSCL 20D

Future high chamber pressure LOX/hydrocarbon booster engines require copper-base alloy main combustion chamber coolant channels similar to the SSME to provide adequate cooling and resuable engine life. Therefore, it is of vital importance to evaluate the heat transfer characteristics and coking thresholds for LNG (94% methane) cooling, with a copper-base alloy material adjacent to the fuel coolant. High-pressure methane cooling and coking characteristics were recently evaluated using stainless-steel heated tubes at methane bulk temperatures and coolant wall temperatures typical of advanced engine operation except at lower heat fluxes as limited by the tube material. As expected, there was no coking observed. However, coking evaluations need be conducted with a copper-base surface exposed to the methane coolant at higher heat fluxes approaching those of future high chamber pressure engines. Author

N85-12319# Army Armament Research and Development Command, Aberdeen Proving Ground, Md. Ballistic Research Lab.
LIQUID PAYLOAD MOMENT EQUATIONS Final Report
J. W. Bradley Aug. 1984 53 p
(DA Proj. 1L1-61102-AH-43)
(AD-A145977; AD-F300465; ARBRL-MR-03371) Avail: NTIS HC A04/MF A01 CSCL 19/1

Murphy has developed linear-theory equations defining the moment exerted by a liquid payload on a spinning, coning projectile. This report re-writes Murphy's equations in a format more amenable to numerical calculations. The equations presented here are essentially those imbedded in our interactive computer program for generating liquid moment coefficients and eigenvalues. GRA

N85-12320# Naval Research Lab., Washington, D. C. .
NUMERICAL SIMULATIONS OF FUEL DROPLET FLOWS USING A LAGRANGIAN TRIANGULAR MESH Interim Memorandum Report
M. J. Fritts, D. E. Fyfe, and E. S. Oran 21 Sep. 1984 55 p
(RR01109)
(AD-A146087; AD-E000599; NRL-MR-5408) Avail: NTIS HC A04/MF A01 CSCL 20/4

This report describes work done to convert the incompressible, Lagrangian, triangular grid code, SPLISH, to the study of flows in and about fuel droplets. This has involved developing, testing and incorporating new algorithms for surface tension and viscosity. The major features of the Lagrangian method and the new algorithms are described. Benchmarks of the new algorithms are given. Several calculations are presented for kerosene droplets in air. Finally, extensions which make the code compressible and three dimensional are discussed. GRA

N85-12321# Ballistic Research Labs., Aberdeen Proving Ground, Md.
A STUDY OF THE CRITICAL LAYER IN A ROTATING LIQUID PAYLOAD Final Report
R. Sedney and N. Gerber Aug. 1984 37 p
(DA Proj. 1L1-61102-AH-43)
(AD-A146094; AD-F300478; ARBRL-TR-02582) Avail: NTIS HC A03/MF A01 CSCL 19/6

The unsteady motion of a fluid which fills a spinning cylinder is considered. Spin-up of the fluid is the basic flow which is perturbed. Non-axisymmetric, viscous perturbations are used to study the wave motion and critical layer. The frequencies and decay rates are determined by the eigenvalues of the system of perturbation equations. For large time the fluid approaches solid body rotation; for this state there is no critical layer and the eigenvalue problem is considerably simpler. The critical layer always exists for small time; it ceases to exist at a time which depends on the parameters of the basic flow and the wave motion. Time histories of the eigenvalues and of the critical layer are given for two cases and two radial modes. The effects of the critical layer on the eigenfunctions and the phase of the velocity are presented. Comparison with the experiment is discussed. GRA

N85-12322# Virginia Polytechnic Inst. and State Univ., Blacksburg.
FLUID MOTION IN A ROTATING AND NUTATING CONTAINER Contractor Report, Jul. 1982 - Jan. 1983
T. Herbert Jul. 1984 52 p
(Contract DAAG29-81-D-0100; DA Proj. 1L1-61102-A-71-A)
(AD-A146175; CRDC-CR-84087) Avail: NTIS HC A04/MF A01 CSCL 20/4

This report describes the initial phase of a study of the fluid motion in a container that is spinning and nutating. The moments exerted by this fluid motion on the container have been demonstrated to cause serious flight instabilities of shells with liquid payloads. The initial phase of our study concentrates on the relevant dimensionless parameters and equations that govern the fluid motion. Various special cases are discussed. Our analysis aims at supporting ongoing experiments at Chemical Systems Laboratory (CSL) and Ballistics Research Laboratory (BRL) and at providing a link between measurements of despin moments and side moments. It also prepares for an in-depth analysis of the interior flow field for comparison with flow visualizations at CRDC. Author (GRA)

N85-12323# Iowa Univ., Iowa City. Inst. of Hydraulic Research.
LAMINAR AND TURBULENT BOUNDARY LAYERS IN A PLANE OF SYMMETRY
J. H. Baek and V. C. Patel Jul. 1984 87 p
(Grant AF-AFOSR-0148-80)
(AD-A146261; IIHR-278) Avail: NTIS HC A05/MF A01 CSCL 20/4

Detailed mean-flow and turbulence measurements have been made in the boundary layer in the plane of symmetry of a body of revolution at incidence. These data and the somewhat limited information available from previous experiments are utilized, together with extensive plane-of-symmetry boundary-layer calculations in laminar and turbulent flows, to determine the most important effects of mean-flow convergence and divergence. Author (GRA)

N85-12324# Illinois Univ., Urbana. Dept. of Mechanical and Industrial Engineering.
MODELING OF PROPULSIVE JET PLUMES--EXTENSION OF MODELING CAPABILITIES BY UTILIZING WALL CURVATURE EFFECTS Interim Report, Sep. 1982 - Jun. 1984
S. E. Doerr Jun. 1984 121 p
(Contract DAAG29-83-K-0043)
(AD-A146262; UILU-ENG-84-4005; ARO-19823.3-EG) Avail: NTIS HC A06/MF A01 CSCL 20/4

Modeling of aerodynamic interference effects of propulsive jet plumes, by using inert gases as substitute propellants, introduces design limits. To extend the range of modeling capabilities, nozzle wall curvature effects may be utilized. Numerical calculations, using the Method of Characteristics, were made and experimental data were taken to evaluate the merits of the theoretical predictions. A bibliography, listing articles that led to the present report, is included. Author (GRA)

N85-12325# Sandia Labs., Albuquerque, N. Mex. Thermomechanical Physical Div.
CONSTITUTIVE FEATURES OF SOLIDS AT SHOCK-WAVE LOADING RATES
D. E. Grady 22 May 1984 9 p refs Presented at the 2nd Army Conf. on Appl. Mat. and Computing, Troy, N.Y., 22-24 May 1984
(Contract DE-AC04-76DP-00789)
(DE84-015715; SAND-82-0792C; CONF-8405221-1) Avail: NTIS

HC A02/MF A01

Solids subjected to high-velocity impact or explosive loading exhibit unusual transient and post-shock properties during the extremely brief period associated with the shock-wave risetime and release. These features can include a unique solid-state shock viscosity behavior, anomalous transient shock-hardening effects, heterogeneous shear effects during the shock risetime, and shock-induced solid state and metallurgical transformations. Improved methods in time-resolved instrumentation are critical in the emerging understanding of these constitutive features. An increasing sophistication in physical and computational modeling is required to incorporate these effects in applied problems of dynamic solid mechanics. DOE

N85-12326# Oxford Univ. (England).
A STUDY OF THE EFFECT OF WAKE-PASSING ON TURBINE BLADES
D. J. Doorly 1984 275 p refs
(Contract RR-2D2-83D; Grant SRC-GRB-17754)
(OUEL-1515/84) Avail: NTIS HC A12/MF A01

A wake generator which allows detailed unsteady heat transfer rate measurements to be made of the effects of wake-passing on a turbine blade was developed. Fluctuating pressure measurements and Schlieren photography were used to record the motion of a chopped wake through the blade passage. The unsteady transition of the blade boundary layer in response to wake-passing was established. Unsteady separation induced by shock cutting is revealed. The complete time history of the boundary layer response to external disturbances was mapped. Fast Fourier Transformation analysis was applied to trace the development of turbulent boundary layer features. Results show that wake-passing can produce significant effects on the mean and fluctuating heat transfer rate to turbine blades. Author (ESA)

N85-12327# Technische Hochschule, Darmstadt (West Germany). Fachbereich Mathematik.
WALL EFFECTS ON THE SLOW STEADY MOTION OF A PARTICLE IN A VISCOUS INCOMPRESSIBLE FLUID
Thomas M. Fischer Jun. 1984 28 p refs Submitted for publication
(Preprint-828) Avail: NTIS HC A03/MF A01

Asymptotic expansions with respect to small Reynolds numbers are proved for the slow steady motion of an arbitrary particle in a viscous, incompressible fluid past a single plane wall. The flow problem is modelled by a boundary value problem for the stationary, nonlinear Navier-Stokes equations. The coefficients of these expansions are the solutions of linear Stokes problems which can be constructed by single layer potentials and corresponding boundary integral equations on the boundary surface of the particle. Asymptotic estimates at small Reynolds numbers for the slow steady motion of an arbitrary particle in a viscous, incompressible fluid between two parallel, plane walls and in a infinitely long, rectilinear cylinder of arbitrary cross section are presented. Author (ESA)

N85-12407 Ceskoslovenska Akademie Ved, Prague. Inst. of the Physics of the Atmosphere.
ON THE CO-VARIANT FORMULATION OF THE LAW OF MOTION OF PASSIVE PARTICLES IN A FIELD OF TURBULENCE
Jiri Horak *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 325-346 refs (For primary document see N85-12389 03-42)
(Rept-564) Avail: Issuing Activity

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources.* For related information see also *06 Aircraft Instrumentation,* and *19 Spacecraft Instrumentation.*

N85-12328 Colorado State Univ., Fort Collins.
PERFORMANCE EVALUATION AND ESTIMATION OF A LASER TIME-OF-FLIGHT VELOCIMETER Ph.D. Thesis
Richard F. Kelly 1984 138 p
Avail: Univ. Microfilms Order No. DA8417095

Using a low power (less than 1 W) CW argon-ion laser, the concepts of single particle photon-burst correlation and detection sensitivity are examined and applied to a laser time-of-flight velocimeter. A scaling law, including the effects of turbulence, for performance evaluation and estimation of the velocimeter in terms of the signal particle arrival rate is developed theoretically and verified experimentally in the laboratory and field. The effect of atmospheric turbulence on the laser beam radius was investigated both theoretically and experimentally. Using the turbulence induced beam radius and the aerosol size distribution constants determined from the scaling law at short ranges, the predicted signal particle arrival rate at a long range of 500 m is found to be comparable to the experimental rates at this range at night. If a higher laser power is used and signal photon bursts from several signal particles arriving at the same time are analyzed properly, this type of laser velocimeter should be suitable for routine wind speed measurements for a range up to 1000 m. Dissert. Abstr.

N85-12329*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A SPHERE-SCANNING RADIOMETER FOR RAPID DIRECTIONAL MEASUREMENTS OF SKY AND GROUND RADIANCE: THE PARABOLA FIELD INSTRUMENT
Donald W. Deering and Peter Leone Nov. 1984 96 p refs Submitted for publication
(NASA-TM-86171; NAS 1.15:86171) Avail: NTIS HC A05/MF A01 CSCL 14B

A unique field instrument, called the PARABOLA, a collapsable support boom, which is self contained and easily transportable to remote sites to enable the acquisition of radiance data for almost the complete (4 pi) sky and ground-looking hemispheres in only 11 seconds was designed. The PARABOLA samples in 15 deg instantaneous field of view sectors in three narrow bandpass spectral channels simultaneously. Field measurement on a variety of earth surface cover types using a truck boom, a specially designed pickup truck mounting system, and a hot air balloon were studied. The PARABOLA instrument has potential for climatological and other studies which require characterization of the distribution of diffuse solar radiation within the sky hemisphere. E.A.K.

N85-12330*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
NASA THUNDERSTORM OVERFLIGHT PROGRAM: ATMOSPHERIC ELECTRICITY RESEARCH. AN OVERVIEW REPORT ON THE OPTICAL LIGHTNING DETECTION EXPERIMENT FOR SPRING AND SUMMER 1983
Otha H. Vaughan, Jr. Nov. 1984 57 p refs
(NASA-TM-86468; NAS 1.15:86468) Avail: NTIS HC A04/MF A01 CSCL 14B

This report presents an overview of the NASA Thunderstorm Overflight Program (TOP)/Optical Lightning Experiment (OLDE) being conducted by the Marshall Space Flight Center and university researchers in atmospheric electricity. Discussed in this report are the various instruments flown on the NASA U-2 aircraft, as well as the ground instrumentation used in 1983 to collect optical and electronic signatures from the lightning events. Samples of some

of the photographic and electronic signatures are presented. Approximately 4132 electronic data samples of optical pulses were collected and are being analyzed by the NASA and university researchers. A number of research reports are being prepared for future publication. These reports will provide more detailed data analysis and results from the 1983 spring and summer program.
Author

N85-12331*# Rocketdyne, Canoga Park, Calif.
NON-INTRUSIVE SPEED SENSOR Final Report
J. Maram and L. Wyett Oct. 1984 60 p refs
(Contract NAS8-34658)
(NASA-CR-171204; NAS 1.26:171204; RI/RD84-232) Avail: NTIS HC A04/MF A01 CSCL 14B

A computerized literature search was performed to identify candidate technologies for remote, non-intrusive speed sensing applications in Space Shuttle Main Engine (SSME) turbopumps. The three most promising technologies were subjected to experimental evaluation to quantify their performance characteristics under the harsh environmental requirements within the turbopumps. Although the infrared and microwave approaches demonstrated excellent cavitation immunity in laboratory tests, the variable-source magnetic speed sensor emerged as the most viable approach. Preliminary design of this speed sensor encountered no technical obstacles and resulted in viable and feasible speed nut, sensor housing, and sensor coil designs. Author

N85-12332*# National Aeronautics and Space Administration, Washington, D. C.
HELIUM IONIZATION DETECTION APPARATUS
Ryukou Nagai Aug. 1984 7 p Transl. into ENGLISH of Japanese Patent no. 58-172544 (Appl. no. 57-55563, 2 Apr. 1982) Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-77505; NAS 1.15:77505) Avail: NTIS HC A02/MF A01 CSCL 14B

In a gas chromatograph apparatus comprising a gas supply (He carrier gas), a sample injection apparatus, a chromatograph column, a He ion detector, and connecting tubes, a foreign gas (other than He) injection apparatus is installed between the sample injection apparatus and the detector. Mixing of the sample gas and foreign gas takes place readily, the sample gas is always maintained at a stable concentrator range, and accurate measurements are possible, especially at low sample gas concentrations.
Author

N85-12333# Massachusetts Inst. of Tech., Cambridge. Lab. of Electronics.
DEVELOPMENT OF OPTICAL TECHNIQUES FOR EARTH ROTATIONAL MEASUREMENTS Final Report, 1 Feb. 1982 - 31 Jan. 1983
S. Ezekiel Apr. 1983 26 p
(Contract F19628-79-C-0082)
(AD-A145859; AFGL-TR-84-0125) Avail: NTIS HC A03/MF A01 CSCL 17/7

The principal objective of the research program is the study of a passive cavity approach for the measurement of inertial rotation in the range 10 to the minus 6th to 10 to the minus 10th of Earth rate. GRA

N85-12334# Naval Weapons Center, China Lake, Calif.
EVOLUTION OF THE NWC (NAVAL WEAPONS CENTER) THERMAL STANDARD. PART 5: THERMAL STANDARD DEVELOPMENT AND APPLICATIONS Technical Summary Paper, 1969 - 1982
R. D. Ulrich Jul. 1984 67 p
(Contracts N60530-81-C-0039; N60530-80-C-0330; N60530-76-C-0091; N00123-76-C-1932; N60530-77-C-0147; F31300)
(AD-A146173; NWC-TP-4834-Pt-5) Avail: NTIS HC A04/MF A01 CSCL 20/13

This report is the fifth in a series of reports covering the development and application of a temperature-measuring device, designated the NWC thermal standard, which can be used to evaluate the thermal response of ordnance. Part 1 of this report series described the theoretical concepts of a thermal standard. Part 2 presented a comparison of predicted and experimental data. Part 3 described use of the thermal standard to determine field thermal response of ordnance stored unsheltered. Part 4 presented the results of several years of data collection in the field, using the thermal standard, along with graphs and analysis of the data. This part of the report series, Part 5, contains a summary of the work done with the thermal standard temperature-measuring device. Development of the device is described, and its applications are discussed. Future uses are suggested. GRA

N85-12335# Army Research Inst. of Environmental Medicine, Natick, Mass.
SMALL ANIMAL HYPOBARIC CHAMBER
J. A. Devine Sep. 1984 19 p
(DA Proj. 3M1-61102-BS-10)
(AD-A146196; USARIEM-T-4/84) Avail: NTIS HC A02/MF A01 CSCL 14/2

The Small Animal Hypobaric Chamber is a special test facility designed and constructed to fill a void that existed for a high-quality, scientific tool providing controlled atmospheric pressure and environmental conditions for studies and experiments which previously could be carried out only on a restricted basis in the laboratory under less-than-ideal conditions. The test facility provides a means for studying laboratory animals under low barometric pressures duplicating those found in mountainous terrain. The basic objectives of the Small Animal Chamber are to extend research capabilities for evaluating the effects of environmental extremes and to develop models for studying the altitude-induced effects on biological systems. GRA

N85-12336# Frequency Electronics, Inc., Mitchel Field, N.Y.
PORTABLE REAL-TIME CLOCK Final Report, Jun. 1978 - Jan. 1981
M. Meirs Griffiss AFB, N.Y. RADC May 1984 42 p
(Contract F19628-78-C-0094)
(AD-A146218; RADC-TR-84-102) Avail: NTIS HC A03/MF A01 CSCL 14/2

In June of 1978, Frequency Electronics was awarded a contract to perform the necessary research and development to advance the state of the art in Cesium beam tube technology and applications to a point that would make it feasible to design and fabricate a portable Cesium Beam Frequency Standard having performance characteristics equivalent to that of the existing non-portable units. The current production model of the Cesium Beam Standard is Model FE-5440A which is presently used in the 616A program and other airborne, shipboard, and ground support systems. The frequency and time signals produced by the Cesium Standard are extremely accurate with tolerances for accuracy and stability being on the order of several parts per 10 to the minus 11th power. GRA

N85-12337# Ballistic Research Labs., Aberdeen Proving Ground, Md.
INSTRUMENTATION TECHNIQUES FOR MEASURING LARGE, HIGH RATE STRAINS WITH FOIL RESISTANCE STRAIN GAGES Final Technical Report
E. J. Rapacki, Jr. Aug. 1984 55 p
(DA Proj. 1L1-61102-AH-43)
(AD-A146248; AD-F300466; ARBRL-TR-02573) Avail: NTIS HC A04/MF A01 CSCL 20/11

Instrumentation for measuring large, high strain rate strains with foil type resistance strain gages was designed, constructed, and evaluated in terms of signal to noise ratio, strain rate response characteristics, and overall accuracy of measurement. Complete design procedures and component specifications for the Wheatstone bridge, pulsed power supply, and control circuit, as well as calibration and data reduction procedures are included. The apparatus has a signal to noise ratio up to six times that which can be obtained with conventional strain gage signal conditioning equipment, and can measure to plus/minus 0.20 strain at strain

rates up to 10 to the 4th power s to the -1 power over a 35 to 200 microsecond sample time. Pulsed power density limits for annealed constantan foil strain gages were also investigated and are reported. GRA

N85-12338# Los Alamos Scientific Lab., N. Mex. Dynamic Testing Div.
MICROSHELL (TRADEMARK)-TIPPED OPTICAL FIBERS AS SENSORS OF HIGH-PRESSURE PULSES IN ADVERSE ENVIRONMENTS
Robert F. Benjamin, Frederick J. Mayer (KMS Fusion, Inc., Ann Arbor, Mich.), and Robert L. Maynard (KMS Fusion, Inc., Ann Arbor, Mich.) 1984 14 p refs Presented at the SPIE Ann. Tech. Symp., San Diego, Calif., 19-24 Aug. 1984
(Contract W-7405-eng-36)
(DE84-015520; LA-UR-84-2345; CONF-840872-12) Avail: NTIS HC A02/MF A01

An optical-fiber sensor for detecting the arrival of strong pressure pulses is described. The sensor consists of an optical fiber, tipped with a gas-filled microballoon. They have been used successfully in adverse environments including explosives, ballistics and electromagnetic pulses (EMP). The sensor produces a bright optical pulse caused by the rapid shock-heating of a gas, typically argon or xenon, which is confined in the spherical glassor plastic microballoon. The light pulse is transmitted via the optical fiber to a photo detector, usually a streak camera or photomultiplier tube. The microballoon optical sensor (called an optical pin by analogy to standard electrical pins), was originally developed for diagnosing an explosive, pulsed-powered generator. Optical pins are required due to the EMP. The optical pins are economical arrival-time indicators because many channels can be recorded by one streak camera. The generator tests and related experiments, involving projectile velocities and detonation velocities of several kilometers per/sec have demonstrated the usefulness of the sensors in explosives and ballistics applications. DOE

N85-12339# Zeiss (Carl), Oberkochen (West Germany). Zentrales Forschungslabor 2.
SIMULTANEOUS MEASURING ABSORPTION SPECTROMETER Final Report, Dec. 1980
Meinrad Maechler Bonn Bundesministerium fuer Forschung und Technologie Jun. 1984 46 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-84-132; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karslruhe, West Germany DM 10

By combining holographic diffraction gratings with linear photodiode arrays, simultaneous-measuring spectrometers were developed. Spectral range is from 200 to 600 nm; spectral band width is 2 to 5 nm; recording and evaluating time is 0.1 sec per spectrum; a digital exit is used for the standardized spectrum; photometric accuracy is better than 0.01; exposure time is chosen to exclude protolysis. The devices are well suited to the examination of small samples. They can be applied as a spectral detector in liquid chromatography and for the measurement of reaction kinetics of phototropical processes. For information processing, a microprocessor system was developed. Author (ESA)

N85-12340# National Bureau of Standards, Washington, D.C. Polymers Div.
DEVELOPMENT OF A POLYMER PRESSURE GAGE WITH TEMPERATURE COMPENSATION
A. J. Bur and S. C. Roth Apr. 1984 32 p refs Sponsored in part by Air Force
Avail: NTIS HC A03/MF A01 CSCL 14B

The development of a temperature compensated pressure transducer is described. The pressure sensing element of this transducer is a thin film of polyvinylidene fluoride which is both piezoelectrically and pyroelectrically active. In order to measure a pressure pulse which is also accompanied by a temperature pulse due to adiabatic heating, it is necessary to correct for the pyroelectric signal. The temperature compensation technique measures the temperature with a fast response thermocouple, to amplify the thermocouple signal in accordance to the pyroelectric response to the transducer and amplified thermocouple signals to produce an output voltage proportional to pressure only. A compensation circuit with a frequency range of 1 Hz to 10,000 Hz was constructed and tested. GRA

N85-12219# Joint Publications Research Service, Arlington, Va.
MINIMIZATION OF ANOMALOUS ERRORS IN MEASURING SYSTEMS EMPLOYING SEARCH AND TESTING DEVICES Abstract Only
V. M. Katikov *In its* USSR Rept.: Electron. and Elec. (JPRS-UEE-84-014) 15 Oct. 1984 p 2-3 refs Transl. into ENGLISH from Radiotek. i Electron., v. 29, no. 5, May 1984 p 920-927 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

N85-12705# Dortmund Univ. (West Germany).
NEUTRON INTERFEROMETRY AND DOUBLE DIFFRACTOMETER FOR CONDENSED MATTER [NEUTRONEN-INTERFEROMETRIE UND- DOPPELDIFFRAKTOMETRIE AN KONDENSIERTEN STOFFEN]
U. Bonse, U. Kischko, A. Rumpf, T. Wroblewski, and I. Hartmann-Lotsch *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 146-155 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

N85-12715# Technische Hochschule, Aachen (West Germany).
CONSTRUCTION, PUTTING INTO OPERATION, AND UTILIZATION OF A TRIPLE AXIS NEUTRON SPECTROMETER Final Report, 1980-1982 [BAU, INBETRIEBNAHME UND NUTZUNG DES DREIACHSEN-NEUTRONEN-SPEKTROMETERS (UNIDAS)]
R. Baldauf, G. Eckold, Th. Hahn, B. O. Hildmann, H. Mitlacher, and H. J. Weber *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 253-268 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

36 LASERS AND MASERS

Includes parametric amplifiers.

N85-12341*# General Electric Co., Schenectady, N. Y. Corporate Research and Development.
LASER BALANCING SYSTEM FOR HIGH MATERIAL REMOVAL RATES Final Report
Marshall G. Jones, Gregory Georgalas, and Angel L. Ortiz Oct. 1984 28 p refs
(Contract NAS3-22814)
(NASA-CR-174731; NAS 1.26:174731; Rept-84-SRD-042) Avail: NTIS HC A03/MF A01 CSCL 20E

A laser technique to remove material in excess of 10 mg/sec from a spinning rotor is described. This material removal rate is 20 times greater than previously reported for a surface speed of 30 m/sec. Material removal enhancement was achieved by steering a focused laser beam with moving optics to increase the time of laser energy interaction with a particular location on the circumferential surface of a spinning rotor. A neodymium:yttrium aluminum garnet (Nd:YAG) pulse laser was used in this work to evaluate material removal for carbon steel, 347 stainless steel, Inconal 718, and titanium 6-4. This technique is applicable to dynamic laser balancing. Author

N85-12342# Battelle Columbus Labs., Ohio.
THREE-DIMENSIONAL PHOTOCHEMICAL MACHINING WITH LASERS Quarterly Research and Development Status Report, 1 May - 31 Jul. 1983
R. E. Schwerzel 30 Nov. 1983 6 p
(Contract F49620-82-C-0077)
(AD-A145792; AFOSR-84-0612TR; QRDSR-4) Avail: NTIS HC A02/MF A01 CSCL 13/8

Research on the development of new photoinitiator systems for spatially selective photochemical machining with lasers has continued smoothly and is progressing well. The porphyrin systems developed during the second quarter continue to look particularly promising. Further experiments on the 2-component photoinitiator systems comprised of 9,10-dibromoanthracene and naphthalene sulfonyl chloride have confirmed that photopolymerization can be selectively enhanced by 2-beam irradiation. This is the first report of a 2-photon, 2-component polymerization system, to our knowledge. Author (GRA)

N85-12343# Westinghouse Defense and Electronic Systems Center, Baltimore, Md. Advanced Technology Div.
ELECTRONIC BANDWIDTH COMPRESSION MODULE Final Report
K. Petrosky and D. Bozanic Mar. 1984 43 p
(Contract N00173-80-C-0204)
(AD-A145843; AD-E001746) Avail: NTIS HC A03/MF A01 CSCL 20/5

This final report describes the design, construction and operation of a 80 stage, high speed CCD based Bandwidth Compression Module which samples a high speed signal at 400 MHz, stores this data, and reads the data out at a 400 kHz rate. The module is to be used for laser pulse recording. GRA

N85-12344# Mission Research Corp., Alexandria, Va.
RF LASER PLASMA MEASUREMENTS
W. M. Bollen Aug. 1984 17 p
(Contract N00014-83-C-2083)
(AD-A145936; MRC/WDC-R-084) Avail: NTIS HC A02/MF A01 CSCL 20/5

One of the major difficulties with excimer lasers has been the presence of impurities, introduced, for example, by the electrodes present in the D.C. discharge approach. Use of microwave excitation makes possible an electrodeless discharge, thereby reducing the risk of introducing impurities into the laser mix. In this approach a tube containing the laser mix is inserted in a waveguide or microwave cavity; the microwaves then break down the laser mix to form a discharge and further interact to heat that discharge. In such microwave discharges, strong fluorescence seems limited to approximately 100 ns. In the same time frame, the fluorescence has also been observed to collapse to the wall. The wall collapse may be related to the reduced fluorescence (reduced radiation area), although burn-up of the lasing components seems more likely. The collapse to the wall reduces the ability to lase by decreasing the active volume. A better understanding of this effect needs to be obtained before a microwave-driven laser can be further developed. This research effort was directed towards obtaining a fundamental understanding of the collapse of the fluorescence to the tube walls. The ultimate goal is to understand the collapse sufficiently to prevent or reduce its effects; to this end, a number of basic plasma physics experiments have been carried out. A complete understanding has not yet been reached. GRA

N85-12345# National Bureau of Standards, Washington, D.C. Electricity Div.
LASER COOLING AND TRAPPING OF NEUTRAL ATOMS Annual Summary Report, 1 Oct. 1983 - 30 Sep. 1984
W. D. Phillips Sep. 1984 4 p
(Contract N00014-84-F-0020)
(AD-A146048) Avail: NTIS HC A02/MF A01 CSCL 20/5

Using laser cooling techniques, we have produced a sample of stopped atoms with sufficiently large density and small velocity width to be useful for loading neutral atom traps. Author (GRA)

N85-12346# Aerospace Corp., El Segundo, Calif. Electronics Research Lab.
HEATSINK REQUIREMENTS FOR COHERENT OPERATION OF HIGH-POWER SEMICONDUCTOR LASER ARRAYS
E. M. Garmire (Southern California Univ., Los Angeles) and M. T. Tavis 27 Aug. 1984 35 p
(Contract F04701-83-C-0084)
(AD-A146184; TR-0084(4925-04)-3; SD-TR-84-28) Avail: NTIS HC A03/MF A01 CSCL 20/5

The heatsink requirements for coherent operation of laser-diode arrays are examined through thermal analysis of semi-infinite heatsinks and the phase locking of laser diodes. The thermal analysis is extended to shaped heatsinks by the use of PATRAN and NASTRAN computer programs. It is shown that mounting laser-diode arrays at the edge of semi-infinite copper heatsinks results in temperature variations between individual laser-diode elements that are too large to permit coherent operation except at relatively low power levels. It is also shown that the use of diamond and shaped heatsinks makes it possible to operate large arrays coherently to high optical output levels. GRA

N85-12347# Defense Intelligence Agency, Washington, D.C. Directorate for Scientific and Technical Intelligence.
BIBLIOGRAPHY OF SOVIET LASER DEVELOPMENTS, NUMBER 65, MAY - JUNE 1983
15 May 1984 166 p
(AD-A146189; DIA-DST-2700Z-003-84) Avail: NTIS HC A08/MF A01 CSCL 20/5

This is the Soviet Laser Bibliography for May-June 1983, and is No. 65 in a continuing series on Soviet laser developments. The coverage includes basic research on solid state, liquid gas, and chemical lasers; components; nonlinear optics; spectroscopy of laser materials; ultrashot pulse generation; crystal growing; theoretical aspects of advanced lasers; and general laser theory. Laser applications are listed under biological effects; communications; beam propagation; adaptive optics; computer technology; holography; laser-induced chemical reactions; measurement of laser parameters; laser measurement applications; laser-excited optical effects; laser spectroscopy, beam-target interaction; and plasma generation and diagnostics. Author (GRA)

N85-12348# Purdue Univ., Lafayette, Ind. School of Mechanical Engineering.
LASER VELOCIMETER MEASUREMENTS AND ANALYSIS IN TURBULENT FLOWS WITH COMBUSTION. PART 3: A CORRECTION LENS FOR LASER DOPPLER MEASUREMENTS IN A CYLINDRICAL TUBE Interim Report, 1 Jan. - 31 Dec. 1983
H. D. Thompson, W. H. Stevenson, and R. P. Durrett Jul. 1984 207 p
(Contract F33615-81-K-2003)
(AD-A146206; AFWAL-TR-82-2076-Pt-3) Avail: NTIS HC A10/MF A01 CSCL 20/5

A lens was designed using analytical ray tracing techniques to correct aberrations caused by a cylindrical tube wall when measurements are made off the plane of symmetry with a Laser Doppler Velocimeter. The single element correction lens was found to work well and good results were obtained out to a normalized tube radius of r/R = 0.83. LDV measurements were made in three axisymmetric flow geometries: a turbulent flow in a straight pipe, a sudden expansion with diameter ratio 1.90:1, and a second sudden explosion with diameter ratio 2.70:1. Mean velocity and turbulence intensity were measured as well as Reynolds stress and turbulence kinetic energy. Numerical predictions of the flow field using the k-epsilon turbulence model were compared to the experimental measurements in the 1:90:1 sudden expansion. In the 2.70:1 sudden expansion, the presence of a secondary recirculation zone in the corner of the step was confirmed and velocity measurements were made in this region. Author (GRA)

N85-12349# Massachusetts Inst. of Tech., Cambridge.
INTERACTION OF UV-LASER RADIATION WITH MOLECULAR SURFACE-FILMS Final Report, 1 Apr. 81 - 31 Mar. 1984
D. J. Ehrlich and J. Y. Tsao 1 Jun. 1984 6 p
(Contract MIPR-ARO-120-83)
(AD-A146311; ARO-17927.38-PH) Avail: NTIS HC A02/MF A01 CSCL 20/5

A new process, Laser Photodeposition (based on surface photo-chemistry), has been demonstrated as means for localized material deposition. The spectroscopy, chemical kinetics and transport properties in adsorbate layers of metal alkyls and

chlorides have been characterized. Surface-modification processes, based on reactions of monomolecular layers, have been demonstrated. The phenomenon of stimulated surface-plasma-wave scattering has been identified and shown widely important in laser/surface interactions. Applications have been demonstrated in microelectronics. Author (GRA)

N85-12350# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
COMPARATIVE REVIEW OF LASER DOPPLER AND LASER TWO-FOCUS ANEMOMETRY IN TURBOMACHINERY APPLICATIONS
R. Kiock May 1984 71 p refs
(VKI-TM-34) Avail: NTIS HC A04/MF A01

Laser Doppler and laser two-focus anemometry (LDA, L2F) for in-rotor measurements of turbomachinery at transonic speed are compared. The beam diameter in the measuring volume of L2F is 1/10 that of LDA, giving a high light concentration in the measuring volume so that measurements can be carried out using L2F without artificial seeding, or with seeding of submicron particle size. Small particles are of low inertia and can follow flow accelerations. This is very important in turbomachinery because of highly curved streamlines and compression shocks. The ability of L2F to detect small particles is its greatest advantage. The L2F can be operated with lower laser power than LDA when a lower light intensity in the measuring volume is acceptable. Minimum wall distance for L2F is 1/5 to 1/15 that of LDA. The L2F requires determination of mean flow direction, before velocity can be evaluated. The L2F fails in highly turbulent flow.
Author (ESA)

N85-11989# Air Force Logistics Command, Wright-Patterson AFB, Ohio.
LASER PAINT REMOVAL
T. Mallets *In* Defense Systems Management Coll. DoD Robotics Appl. Workshop Proc. 1983 p 368-371 (For primary document see N85-11978 03-01)
(AD-P004009) Avail: NTIS HC A21/MF A01 CSCL 13/8

N85-12241# Joint Publications Research Service, Arlington, Va.
PULSED NEODYMIUM GLASS LASER SYSTEM FOR INVESTIGATING NONLINEAR OPTICAL PHENOMENA IN GASES Abstract Only
V. F. Lukinkh, S. A. Myslivets, and V. V. Slabko *In its* USSR Rept.: Electron and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 50-51 Transl. into ENGLISH from Z. Tek. Fiz. (Leningrad, v. 54, no. 5, May 1984 p 879-882 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

N85-12249# Joint Publications Research Service, Arlington, Va.
BREAKDOWN OF POROUS METALS BY LASER RADIATION Abstract Only
A. A. Uglov and V. A. Grebennikov *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 9 Transl. into ENGLISH from Fiz. i Khim. Obrabotki Materialov (Moscow), no. 3, May - Jun. 1984 p 21-24 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

N85-12820# Manchester Univ., MacClesfield (England). Nuffield Radio Astronomy Lab.
MASERS ASSOCIATED WITH REGIONS OF RECENT STAR FORMATION
R. J. Cohen and P. R. Rowland *In* Royal Observatory Star Formation Workshop 1984 p 117-128 refs (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N85-12351 Minnesota Univ., Minneapolis.
BURMESTER THEORY FOR 4 PRECISION POSITIONS: AN EXTENDED DISCOURSE WITH APPLICATION TO THE DIMENSIONAL SYNTHESIS OF ARBITRARY PLANAR LINKAGES Ph.D. Thesis
Thomas Richard Chase 1984 335 p
Avail: Univ. Microfilms Order No. DA8418457

Dimensional synthesis of a planar linkage consists of determining the link lengths of a predefined linkage topology to accomplish some predefined task. Burmester theory provides a well known solution to the problem of determining vector pairs, called dyads, which will assemble at four arbitrarily prescribed orientations. Mechanisms are dimensionally synthesized using Burmester theory by prescribing the orientations for a combination of these vector pairs such that they can be assembled into a solution linkage modelled with these vectors. A method for generating the Burmester curves using a complex number formulation of the four precision position synthesis problem is reviewed. Efficiently generating, representing and interacting with a set of Burmester curves requires a knowledge of the curve properties which will result from an arbitrary set of precision positions. Methods for determining these properties using a complex number formulation are developed. These methods are particularly well suited for implementation using computer assisted techniques.Dissert. Abstr.

N85-12352 Washington Univ., Seattle.
AN EXPERIMENTAL INVESTIGATION AND NUMERICAL SIMULATION OF THE THERMOMECHANICAL PHENOMENA IN COMPRESSOR ROTOR TIP RUBBING Ph.D. Thesis
Shahrokh Etemad 1984 122 p
Avail: Univ. Microfilms Order No. DA8419134

Experimental results are presented for titanium blade specimen tips of various configurations rubbing against a sintered powder nichrome seal. Data for bare square ended blade tips revealed that, in general, the measured average forces of interaction and the surface temperatures monotonically increase with elapsed time. This increase was due to the formation of a layer of densified material at the seal surface. The measured data can be correlated by the seal densification parameter, which is a measure of the degree of compaction of the seal surface layer. A phenomenological modeling of the thermomechanical phenomena and the importance of the thermal behavior are discussed. A thermal numerical modeling of intermittent rubbing, taking into account the concept of thermal contact resistance, is presented. The predicted temperatures showed that the spatial variations of frictional heating and thermal contact resistance along the path of rubbing is significant in defining the nature of the rubbing. From a coating selection point of view, the thermal conductivity of the coating is more significant than the thermal capacitance in reducing the interfacial temperatures. Dissert. Abstr.

N85-12353# Materials Research Labs., Melbourne (Australia).
PENETRATOR/ARMOUR INTERACTIONS: BACKGROUND TO AUSTRALIAN WORK
R. L. Woodward and B. J. Baxter Aug. 1984 21 p refs
(MRL-R-936; AR-003-920) Avail: NTIS HC A02/MF A01

Australian contributions to research in high rate deformation studies with particular reference to penetration mechanics and armor are reviewed. Computationally efficient models were developed which facilitate rapid and inexpensive predictions of penetration behavior. The scope and accuracy of various computational methods are discussed, together with some practical applications. A bibliography lists the major publications in subject areas of relevance. Author

N85-12354*# National Aeronautics and Space Administration, Washington, D. C.
MICROSCOPIC ASPECTS OF THE EFFECT OF FRICTION

REDUCERS AT THE LUBRICATION LIMIT Ph.D. Thesis
J.-L. Mansot Jun. 1984 102 p refs Transl. into ENGLISH of "Aspects microscopiques de l'action des reducteurs de frottement en lubrification limite" Lyon, 1982 140 p Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Ecole Centrale de Lyon
(Contract NASw-3541)
(NASA-TM-77413; NAS 1.15:77413) Avail: NTIS HC A06/MF A01 CSCL 11H

An attempt is made to analytically model the physicochemical properties of lubricants and their capacity to reduce friction. A technique of frozen fracturing of the lubricants was employed to study the dispersion of additives throughout a lubricant. Adsorption was observed at the liquid-solid interface, which was the region where the solid and lubricant met, and the molecular dispersion of the additive enhanced the effectiveness of the lubricant. The electrically conductive characteristics of the lubricant at the friction interface indicated the presence of tunneling effects. The Bethe model was used to examine the relationship between the coefficient of friction and the variation of interface thickness. The electron transport permitted an inelastic tunnel electron spectroscopic investigation of the molecular transformations undergone by the additive during friction episodes. Author

N85-12355# Carnegie-Mellon Univ., Pittsburgh, Pa. Robotics Inst.
THE SEARCH FOR REGULARITY: FOUR ASPECTS OF SCIENTIFIC DISCOVERY Interim Technical Report, Mar. - Aug. 1984
P. Langley, J. Zytkow, H. A. Simon, and G. L. Bradshaw 1 Sep. 1984 39 p
(Contract N00014-84-K-0345)
(AD-A145939; CMU-RI-TR-84-20) Avail: NTIS HC A03/MF A01 CSCL 06/4

Scientific discovery is a complex activity involving many different components. Our interest in discovery has led us to construct four artificial intelligence systems that address different facets of this process. BACON.6 focuses on discovering empirical laws that summarize numerical data. This program searches a space of data and a space of numerical laws, and includes methods for postulating intrinsic properties and noting common divisors. GLAUBER is concerned with discovering laws of qualitative structure, such as the hypothesis that acids react with alkalis to form salts. It searches the space of qualitative laws, using evaluation functions to focus attention on laws covering the greatest number of observed facts. STAHL attempts to determine the components of substances involved in reactions, and has been used to model the reasoning that led to the phlogiston theory. This system searches through the space of componential models, using heuristics to make plausible inferences. The final system, DALTON, is concerned with formulating structural models of chemical reactions. It searches the space of possible models, considering simple models before more complex ones and using a conservation assumption to constrain possibilities. While each of these discovery systems is interesting in its own right, we are also exploring ways in which the systems can interact to help direct each other's search processes. Author (GRA)

N85-11986# Ogden Air Logistics Center, Hill AFB, Utah.
AIR FORCE, ROBOTIC PAINTING
R. V. Grabler *In* Defense Systems Management Coll. DoD Robotics Appl. Workshop Proc. 1983 p 307-314 (For primary document see N85-11978 03-01)
(AD-P004006) Avail: NTIS HC A21/MF A01 CSCL 13/8

N85-11987# Letterkenny Army Depot, Chambersburg, Pa.
NEO ROBOTIC APPLICATION DEVELOPMENT AT LETTERKENNY ARMY DEPOT: THE APPLICATION OF ROBOTICS TO AGRICULTURAL BLAST CLEANING
J. Nitterhouse and S. Kalabokes *In* Defense Systems Management Coll. DoD Robotics Appl. Workshop Proc. 1983 p 358-362 (For primary document see N85-11978 03-01)
(AD-P004007) Avail: NTIS HC A21/MF A01 CSCL 13/8

N85-11988# Defense Logistics Agency, Alexandria, Va.
DEPOT MODERNIZATION AT THE DEFENSE LOGISTICS AGENCY
T. L. Kirkham *In* Defense Systems Management Coll. DoD Robotics Appl. Workshop Proc. 1983 p 364-367 (For primary document see N85-11978 03-01)
(AD-P004008) Avail: NTIS HC A21/MF A01 CSCL 15/5

N85-11991# San Antonio Air Logistics Center, Kelly AFB., Tex.
FUTURE ROBOTICS PROGRAM AT SAN ANTONIO ALC (AIR LOGISTICS CENTER)
D. Ferry *In* Defense Systems Management Coll. DoD Robotics Appl. Workshop Proc. 1983 p 381-384 (For primary document see N85-11978 03-01)
(AD-P004011) Avail: NTIS HC A21/MF A01 CSCL 13/8

N85-11993# Naval Supply Center, San Diego, Calif.
SUPPLY CENTER PROCESSES
A. Senhen *In* Defense Systems Management Coll. DoD Robotics Appl. Workshop Proc. 1983 p 438-461 (For primary document see N85-11978 03-01)
(AD-P004014) Avail: NTIS HC A21/MF A01 CSCL 15/5

N85-11994# Letterkenny Army Depot, Chambersburg, Pa.
POTENTIAL APPLICATION OF ROBOTICS AND STATE-OF-THE ART END EFFECTORS AT LETTERKENNY ARMY DEPOT
J. Nitterhouse and S. Kalabokes *In* Defense Systems Management Coll. DoD Robotics Appl. Workshop Proc. 1983 p 464-467 (For primary document see N85-11978 03-01)
(AD-P004015) Avail: NTIS HC A21/MF A01 CSCL 13/8

N85-11995# Tooele Army Depot, Utah.
FIELD APPLICATIONS FOR ROBOTIC MATERIEL HANDLING
F. Eldredge *In* Defense Systems Management Coll. DoD Robotics Appl. Workshop Proc. 1983 p 473-476 (For primary document see N85-11978 03-01)
(AD-P004016) Avail: NTIS HC A21/MF A01 CSCL 15/5

N85-12192# Joint Publications Research Service, Arlington, Va.
FRENCH FIRMS DEVELOP ARTIFICIAL INTELLIGENCE ROBOT
In its West Europe Rept.: Sci. and Technol., No. 166 (JPRS-84845) 30 Nov. 1983 p 16 Transl. into ENGLISH from Electron. Actualites (Paris), 21 Oct. 1983 p 22 (For primary document see N85-12190 03-31)
Avail: NTIS HC A05/MF A01

N85-12198# Joint Publications Research Service, Arlington, Va.
SENSOR TECHNOLOGY FOR SECOND, THIRD GENERATION INDUSTRIAL ROBOTS. OPTICAL SENSOR APPLICATIONS
Dietmar Otto *In its* East Europe Rept.: Sci. Affairs, No. 791 (JPRS-84624) 26 Oct. 1983 p 18-21 refs Transl. into ENGLISH from Urania (Leipzig), v. 33, no. 8, Aug. 1983 p 12-16 (For primary document see N85-12195 03-31)
Avail: NTIS HC A07/MF A01

N85-12211# Joint Publications Research Service, Arlington, Va.
DEVELOPMENT, PRODUCTION, APPLICATION OF ROBOTS ASSESSED
Tadeusz Jaworski *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-038) 25 Oct. 1984 p 1-3 Transl. into ENGLISH from Trybuna Ludu (Warsaw), 15-16 Sep. 1984 p 3 (For primary document see N85-12210 03-31)
Avail: NTIS HC A04/MF A01

N85-12222# Joint Publications Research Service, Arlington, Va.
INDUSTRIAL ROBOTS AND TRANSMANIPULATIONS: IMPORTANT LINK IN SETUP OF AUTOMATED PRODUCTION LINES Abstract Only
Yu. N. Zhukov and S. D. Smirnov *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 14 Transl. into ENGLISH from Electrotek. (Moscow), no. 4, Apr. 1984 p 2-4 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

N85-12223# Joint Publications Research Service, Arlington, Va.
MODULAR ELECTROMECHANICAL INDUSTRIAL ROBOTS Abstract Only
S. V. Gruzdev, O. B. Korytko, and Ye. I. Yurevich *In its* USSR Rept.: Electron and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 15 Transl. into ENGLISH from Elektrotek. (Moscow), no. 4, Apr. 1984 p 4-7 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

N85-12224# Joint Publications Research Service, Arlington, Va.
INTERNATIONAL EXHIBITION: INDUSTRIAL ROBOTS, 1982 Abstract Only
V. G. Galenko, B. M. Bodrov, and V. V. Shishkin *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 15-16 Transl. into ENGLISH from Elektrotek. (Moscow), no. 4, Apr. 1984 p 9-12 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

N85-12225# Joint Publications Research Service, Arlington, Va.
ROBOTIZATION OF ELECTRIC WELDING PROCESSES Abstract Only
Yu. A. Klochkov and V. S. Korshunov *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 16-17 Transl. into ENGLISH from Elektrotek. (Moscow), no. 4, Apr. 1984 p 13-14 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

N85-12226# Joint Publications Research Service, Arlington, Va.
ROBOTIZATION OF TECHNOLOGICAL PROCESSES IN HIGH-FREQUENCY HEATING AND WELDING Abstract Only
F. V. Bezmenov, S. Ye. Ryskin, V. G. Shevchenko, and Yu. F. Shukkel *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 18 Transl. into ENGLISH from Elektrotek., (Moscow), no. 4, Apr. 1984 p 18-19 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

N85-12227# Joint Publications Research Service, Arlington, Va.
IMPROVING OPERATIONAL RELIABILITY AND PRODUCTIVITY OF ROBOTIZED TECHNOLOGICAL COMPLEXES Abstract Only
V. G. Galenko, Yu. Ye. Onichikin, and I. M. Belyavskiy *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 18-19 Transl. into ENGLISH from Elektrotek. (Moscow), no. 4, Apr. 1984 p 19-22 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

N85-12263# Joint Publications Research Service, Arlington, Va.
COMPACT WELDING APPARATUS WITH SOLAR POWER SUPPLY Abstract Only
In its USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 36 Transl. into ENGLISH from Rabochaya Gazeta (Kiev), 23 Aug. 1984 p 1 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

N85-12264# Joint Publications Research Service, Arlington, Va.
NEW WELDING EQUIPMENT FOR MECHANIZED WELDING AND TRENDS IN FURTHER DEVELOPMENT Abstract Only
A. I. Chvertko *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 37 Transl. into ENGLISH from Avtomat. Svarka (Kiev), no. 5, May 1984 p 50-56 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

N85-12265# Joint Publications Research Service, Arlington, Va.
LASER AND DIFFUSION WELDING EQUIPMENT R AND D Abstract Only
In its USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 39 Transl. into ENGLISH from Vecherniy Leningr. (Leningrad), 14 Apr. 1984 p 2 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

N85-12267# Joint Publications Research Service, Arlington, Va.
ELECTRIC WELDING INSTITUTE'S SPACE-TECHNOLOGY TEST RESULTS Abstract Only
T. Latina *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 40-41 Transl. into ENGLISH from Vyshka (Baku), 28 Jul. 1984 p 2 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N85-12356# United Kingdom Atomic Energy Authority, Harwell (England). Theoretical Physics Div.
IDENTIFICATION OF PULSE-ECHO RAYS IN AUSTENITIC STEELS
J. A. Ogilvy Apr. 1984 24 p refs
(AERE-R-11265) Avail: NTIS HC A02/MF A01

Problems occurring when Pulse-Echo ultrasonic inspection of defects in anisotropic media is carried out are studied. Theoretical work is used to deduce the origin of Pulse-Echo signals in such media. It is concluded that such signals will arise when a ray impinges on a defect whose face is perpendicular to the ray's phase velocity. It is shown that for anisotropic media, the energy propagation of such rays is not necessarily perpendicular to the defect face. Beam energy may be incident onto a defect at some angle non-normal to the defect face and yet give rise to a Pulse-Echo signal. These results are quantified for Pulse-Echo inspection of defects in austenitic weld material. Correct interpretation of signals may, in principle, be performed, eliminating errors in calculating defect orientation and location. B.W.

N85-12357# Rome Air Development Center, Griffiss AFB, N.Y.
BALLPARK RELIABILITY ESTIMATION TECHNIQUES
F. Winter Apr. 1984 34 p
(AF Proj. 2338)
(AD-A145971; RADC-TR-84-83) Avail: NTIS HC A03/MF A01 CSCL 14/4

This report analyzes data obtained from the RADC Computer Program ORACLE, a program which performs failure rate predictions of electronic equipment according to MIL-HDBK-217, in order to develop a ballpark failure rate estimation technique. Simplified formulas based on average parameters provided by the data and an average failure rate per part are developed to provide a fast and easy method to approximate the reliability of electronic systems. Author (GRA)

N85-12358# Systems Research Labs., Inc., Dayton, Ohio. Research Applications Div.
RESEARCH IN QUANTITATIVE NDE TECHNIQUES Final Report, 30 Apr. 1980 - 31 Aug. 1983
D. A. Stubbs and W. C. Hoppe Mar. 1984 204 p
(Contract F33615-80-C-5015)
(AD-A145990; SRL-6575; AFWAL-TR-84-4026) Avail: NTIS HC A10/MF A01 CSCL 13/8

Analyses of nonspecular reflection of acoustic waves from an interface between a fluid and both a planar, layered halfspace and a corrugated halfspace were conducted. Dispersion of the velocity, the Schoch displacement parameter of leaky Rayleigh waves, and the amplitude distribution of the reflected field were studied. For the Planar halfspace one exact and two approximate models are presented. In a study of reflection of Rayleigh surface

waves from surface cracks, it was found theoretically and confirmed experimentally that transverse in-plane stresses in the surface wave cause reflections from cracks oriented normal to wavefronts. Several studies were conducted on the interaction of ultrasound and fibrous composites. GRA

N85-12359# Technical Research Centre of Finland, Espoo. Metals Lab.
PREDICTION OF WELD DEFECTS USING WELDING CONDITION DATA
Kalervo Leino, Ari Nikkola, and Karri Vartiainen May 1984 50 p refs Sponsored by Nordic Industrial Fund, Finnish Ministry of Trade and Industry
(VTT-RR-264; ISBN-951-38-1546-3; ISSN-0358-5077) Avail: NTIS HC A03/MF A01

The behavior of welding parameters in GMA-welding during artificial disturbances causing weld defects was studied. Weld quality can be monitored online by following the behavior of the welding process parameters, if the parameter values resulting in an acceptable quality level, and the probable defect sources and their tendency to cause defects are known. Defect sources that affect the parameters all affect short-circuiting frequency, which describes the metal transfer process in the welding arc. Defect sources can be detected with high reliability particularly in short arc welding. Careful control of the welding current, the voltage and the welding head travel speed is essential, and in spray-arc welding it is the only way to monitor the weld quality.
Author (ESA)

N85-12360# National Bureau of Standards, Washington, D.C. Office of Nondestructive Evaluation.
TECHNICAL ACTIVITIES 1983, OFFICE OF NONDESTRUCTIVE EVALUATION Annual Report
L. Mordin Jan. 1984 203 p refs
(PB84-217074; NBSIR-84-2815) Avail: NTIS HC A10/MF A01 CSCL 11B

The technical activities in nondestructive evaluation that were carried out by or for the National Bureau of Standards in FY-83 are reviewed. Among the methods discussed are: liquid penetrant and magnetic particle methods, radiography, neutron methods, ultrasonic methods, acoustic emission methods, eddy-current and electrical methods, and optical and thermal methods. R.S.F.

N85-11992# Sacramento Air Logistics Center, McClellan AFB, Calif.
ROBOTICS IN NONDESTRUCTIVE INSPECTION AT SACRAMENTO AIR LOGISTICS CENTER
D. Froom *In* Defense Systems Management Coll. DoD Robotics Appl. Workshop Proc. 1983 p 385-390 (For primary document see N85-11978 03-01)
(AD-P004012) Avail: NTIS HC A21/MF A01 CSCL 14/2

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N85-12361 Stanford Univ., Calif.
STATIC AND DYNAMIC CHARACTERISTICS OF MATERIALS WITH BEAM-MICROSTRUCTURE Ph.D. Thesis
Kil Soo Kim 1984 285 p
Avail: Univ. Microfilms Order No. DA8412858

A systematic method is developed, by which a generalized continuum is defined as an analytical model of a general periodic beam-structured material. It is shown that the micropolar continuum of the general form is the analytical model of a single-atom type periodic beam structure. The nonclassical material constants are determined by the structural properties of beam members and the geometric characteristics of the spatial periodicity. A classical continuum is also developed, and it is proved to be useful in the description of the overall behavior of a beam-structured material. The mechanical behavior of beam-structured materials and the effectiveness of the continuum models in the description of them are investigated as follows: The behavior of beam structures at the boundary is studied and appropriate boundary conditions of the continuum are defined. The micropolar continuum describes an exponentially decaying distribution of displacements in boundary zones. However, it does not describe the oscillatory distribution of displacements in boundary zones of 2-dimensional equilateral triangular grids. Dissert. Abstr.

N85-12362 Wisconsin Univ., Madison.
ON-LINE FATIGUE LIFE PREDICTION UNDER STOCHASTIC LOADING BY THE TIME SERIES MODELING Ph.D. Thesis
Budy Darmono Notohardjono 1984 295 p
Avail: Univ. Microfilms Order No. DA8414252

A new, on line method for Fatigue Failure Forecasts (FFF) by time series modeling of the correlated strain output of a fatigue process under stochastic loading is discussed. For that purpose, computer modeling of the stochastic strain data and a fatigue failure prediction based on the Dynamic Data System (DDS) methodology is presented. The approach uses the off line experimental results to determine a correlation between the key model parameter for prediction, the normalized damping factor, and the life time used up until that time. The new method can be used for on line prediction of a potential fatigue failure without knowing the prior load history or the future loading pattern. In addition, the on line FFF method presented has the capability to update the prediction, which is an effective tool for reducing the prediction error. Several illustrations demonstrating the application of the FFF method and its accuracy are given, and additional applications are suggested. Dissert. Abstr.

N85-12363 Virginia Polytechnic Inst. and State Univ., Blacksburg.
FATIGUE LIMIT ANALYSIS INVOLVING BIAXIAL STRESS COMPONENTS Ph.D. Thesis
Edgar Gray Munday 1984 160 p
Avail: Univ. Microfilms Order No. DA8417828

Biaxial stress fatigue data is carefully examined in order to determine how much foundation exists for a rational approach to classical stress based fatigue limit analysis involving biaxial stress components. A review is given of the methods presently in vogue, and new methods are suggested for obtaining equivalent mean and equivalent alternating stresses. Some ground work is laid for the consideration of stress gradient influence on fatigue behavior. There are also some observations concerning the Distortional Energy and Tresca criteria and how they are incorporated in fatigue design procedures. The work is restricted to cases in which the alternating principal stress axes have fixed orientation.
Dissert. Abstr.

N85-12364 Illinois Inst. of Tech., Chicago.
INTERACTIONS AMONG SYSTEM STIFFNESS, WEAR AND VIBRATIONS Ph.D. Thesis
Iqbal Shareef 1984 176 p
Avail: Univ. Microfilms Order No. DA8418400

A fundamental investigation was carried out, both experimentally and analytically, to establish parametric relationships among friction, wear, and system stiffness. The results indicate that stiffness has significant effect on transition from mild to severe wear and to the onset of self excited vibrations; both in dry and water lubricated sliding contact. It is shown that wear is an increasing function of system stiffness. The increase in frequency of applied load oscillations in normal direction causes increase of number of loading cycles per unit time that, in turn, causes increased rate of wear particle formation due to fatigue. A wear model is developed which accounts for slider oscillation in the normal direction. Good correlation is found between theoretical analysis and experimental results. Dissert. Abstr.

N85-12365 Vanderbilt Univ., Nashville, Tenn.
VISCOPLASTIC FINITE ELEMENT ANALYSIS OF RAPID

FRACTURE Ph.D. Thesis
Rainer Hoff 1984 327 p
Avail: Univ. Microfilms Order No. DA8417016

The stress and strain fields around rapidly loaded stationary and propagating crack tips are examined. In particular, the strain rate dependent, i.e., viscoplastic, nature of the flow properties of A533B are characterized and employed in fracture analyses. A new closed form solution is determined for rapidly loaded stationary cracks in viscoplastic materials. A simple modification of the parameters in the power stress-strain law is presented whereby the classical Hutchinson-RiceRosengren singularity solutions can be applied to viscoplastic materials. Finite element computations agree well with this approach. A technique using gap finite elements is developed to model crack extension. Finite element simulations of slow stable crack growth agree well with experimental data using a J-integral/crack tip opening angle propagation criteria. The crack extension technique is extended to model rapidly propagating cracks-crack velocities of up to 120 m/s are obtained. Results show that viscoplastic materials dissipate significantly more energy than strain rate insensitive materials during rapid fracture.
Dissert. Abstr.

N85-12366 New Hampshire Univ., Durham.
COMPLEX FREQUENCY ANALYSIS OF DAMPED THIN-WALLED BEAMS WITH OPEN CROSS SECTIONS Ph.D. Thesis
Mohamed Fouad Ahmad 1984 345 p
Avail: Univ. Microfilms Order No. DA8419548

The dynamic equilibrium equations for thin-walled beams of open cross section are derived with reference to an arbitrary system of coordinates. Exact stress resultant-displacement relation of the bending theory of cylindrical shells has been used and therefore the shell curvature, secondary warping, and rotary inertia effects are included in the derivation. The equilibrium equations have been referred to principal coordinates in order to reduce the coupling between the different displacement components. The principal coordinates and the associated cross sectional properties for some sections have been studied. The structural damping effect has been introduced to the equilibrium equations through complex moduli concept. The dynamic direct stiffness has been used as a base for a numerical solution of the complex frequency response problem. A computer program has been written to perform the process. This program has been used in both free and forced response of thin-walled beams. The natural frequencies calculated are compared with solutions obtained by the finite element method as well as experimental work of other investigators. Dissert. Abstr.

N85-12367 Lehigh Univ., Bethlehem, Pa.
APPLICATIONS OF INTEGRAL EQUATIONS WITH STRONG SINGULARITIES IN FRACTURE MECHANICS Ph.D. Thesis
Ahmet Cemalettin Kaya 1984 287 p
Avail: Univ. Microfilms Order No. DA8418418

Certain types of singular integrals which arise in the formulation of two-dimensional and three dimensional crack problems are investigated. Although these integrals do not exist in the classical sense, they can be reinterpreted and evaluated using Hadamard's concept of finite-part integrals. Taking this as the starting point the thesis has been divided into two parts. In the first part, various methods for the numerical evaluaton of finite-part integrals with 1/(t-x)(2) singularities and the approximate solution techniques for the related integral equations are explained. Using integral transforms some two-dimensional crack problems are formulated in terms of singular integral equations which are then solved by applying the Galerkin or the collocation methods. In the second part, a chronological review of the literature on the three-dimensional crack problems is given and different solution methods are summarized. Papkovitch-Neuber potentials are used to formulate the problem of a plane crack in a half-space and in an infinite strip. The two-demensional singular integrals are evaluated by reducing them to finite-part integrals. Special cases where the crack occupies a circular or an elliptical region are discussed. Dissert. Abstr.

N85-12368 Cornell Univ., Ithaca, N.Y.
AN INVERSE SOURCE PROBLEM FOR ELASTIC WAVES Ph.D. Thesis
Jennifer Emmons Michaels 1984 159 p
Avail: Univ. Microfilms Order No. DA8415405

The response to a transient source of excitation in an elastic medium is determined by recording the resulting wave motion. The inverse source problem is the determination of properties of the source from the recorded response, given knowledge of the medium. Sources with non-zero zeroth moment, which correspond to concentrated forces, and non-zero first moment, which correspond to moment tensor sources, are considered. An inversion procedure is presented for a separable point source acting at a known location in a plate. A key step for experimental work is the characterization of a piezoelectric transducer by a velocity transfer function. The inversion procedure is demonstrated for synthetic data that were calculated for assumed sources. Experiments were performed by applying dynamic oblique forces with known characteristics to the surface of a plate. The orientation and time function of the forces were successfully recovered by inversion. It is anticipated that this inversion method can be applied for a point source in any medium with known Green's functions.
Dissert. Abstr.

N85-12369*# National Aeronautics and Space Administration, Washington, D. C.
BENDING STRENGTH STUDIES ON HOT-PRESSED SILICON CARBIDE
J. Kriegesmann Aug. 1984 13 p refs Transl. into ENGLISH from Ber. der Deut. Keram. Ges. (West Germany), v. 55, no. 8, 1978 p 391-394 Transl. by Scientific Translation Service, Santa Barbara, Calif. Original doc. prep. by Electric Smelting Plant Kempten, Inc., West Germany
(Contract NASw-3542)
(NASA-TM-77512; NAS 1.15:77512) Avail: NTIS HC A02/MF A01 CSCL 20K

The 4-point bending strength of 4 grades of hot-pressed SiC was determined at different temperatures. With a transgranular mode of fracture the values for bending strength are retained up to high temperatures. For intergranular fracture the decrease of strength is governed by subcritical crack growth. The intergranular fracture is caused by a high content of silicate glassy phase at the grain boundaries of hot-pressed SiC. Author

N85-12370# Admiralty Marine Technology Establishment, Teddington (England).
THEORETICAL AND EXPERIMENTAL MODAL ANALYSIS OF A ROTOR TEST RIG
D. A. Cordner Aug. 1983 40 p refs
(AMTE(N)-TM-83079; BR92591) Avail: NTIS HC A03/MF A01

In order to study the vibration of shipboard machinery, a modal analysis was performed on an experimental rig consisting of a rotor/motor assembly connected to a base plate mounted on a test bed, using a software package for the calculation of modal parameters from experimental data, and a theoretical model using the coupling of dynamic stiffness matrices. Results for the experimental method are disappointing, but the coupling model gives a good approximation of real values. Author (ESA)

N85-12371# Naval Ship Research and Development Center, Bethesda, Md.
COMPARISON OF PREDICTED AND MEASURED FRICTION FOR A TILT-PAD THRUST BEARING WITH CROWN AND ROUGHNESS UNDER HYDRODYNAMIC AND MIXED LUBRICATION Final Report
T. L. Daugherty Jul. 1984 54 p
(AD-A145752; DTNSRDC-84/025) Avail: NTIS HC A04/MF A01 CSCL 20/11

In a controlled experiment on a tilt-pad thrust bearing having measured surface crown and longitudinal roughness, the frictional results were compared with results predicted by a physico-mathematical model of the bearing. The bearing operated hydrody-

namically using 2190 TEP oil at ambient and 150 F bulk temperature under loads approaching 500 psi. GRA

N85-12372# IIT Research Inst., Chicago, Ill.
WEAR AND CORROSION OF COMPONENTS UNDER STRESS AND SUBJECTED TO MOTION Final Report
K. Y. Kim and S. Bhattacharyya 5 Mar. 1984 150 p
(Contract N62269-79-C-0702)
(AD-A145781; IITRI-M06060-16; NADC-79137-60) Avail: NTIS HC A07/MF A01 CSCL 20/11

The initial two-year study with full rotational motion (NADC-79137-60) was further extended with investigations under oscillatory motion to advance understanding of simultaneously occurring corrosion-wear phenomena in Navy aircraft components, and to use this knowledge to improve reliability in component performance. An additional corrosion-wear parameter, namely, coefficient of friction, was evaluated along with open-circuit potential, corrosion current density, and wear loss, which were statistically analyzed in terms of load, frequency, corrosion inhibitor, and lubricant, as well as run-in time. Corrosion-wear surface morphologies were examined with SEM and EDX, and surface roughness measurements were analyzed. The effect of wear on the corrosion process was very marked for alloys which were able to form a passive film. Disruption of the passive film was the principal factor leading to an increase in corrosion rate and wear loss, while surface deformation by increasing load and motion within the range evaluated appeared to be secondary. An increase in load at a constant frequency did not affect the polarization reaction processes as much as an increase in frequency at a constant load. It was clearly demonstrated that wear phenomena dominate the anodic polarization process, but not the cathodic polarization process. GRA

N85-12373# California Univ., Livermore. Lawrence Livermore Lab.
NUMERICAL SIMULATIONS OF COMPLIANT MATERIAL RESPONSE TO TURBULENT FLOW, REVISION 1
A. C. Buckingham, M. S. Hall, and R. C. Chun Aug. 1984 34 p
(Contracts N00014-83-F-0010; W-7405-eng-48)
(AD-A145801; UCRL-89400-REV-1; Paper-84-0537-Rev) Avail: NTIS HC A03/MF A01 CSCL 13/10

Homogeneous and internally structured material coatings are studied numerically as candidates for drag and turbulence generated noise reduction on submersible hulls. Dynamic motions of compliant surfaces may conceptually interrupt random turbulent motions, reducing the turbulent interface stresses and absorbing turbulent energy, and consequently reducing the turbulence at the flow/coating interface. Time dependent, two and three dimensional Monte-Carlo turbulent pressure field models, and interactive Navier-Stokes pseudo-spectral methods are used to represent the unsteady flow, while finite element methods are applied to represent a variety of homogeneous, layered, and internally structured material coatings. The influence of added mass and in-depth overburden on the material response in ocean water is discussed. Promising compliant material coatings include sandwiches of soft, homogeneous layers between thin, stiffer elastic materials and internally structured coatings combining streamwise ribs, and spanwise voids separated by stiff elastic supporters imbedded in soft yielding viscoelastic layers. Author (GRA)

N85-12374# North Carolina Univ., Charlotte. Dept. of Mathematics.
OPTIMUM REPLACEMENT OF A SYSTEM SUBJECT TO SHOCKS
M. Abdel-Hameed Aug. 1984 12 p
(Grant AF-AFOSR-0245-80)
(AD-A145811; AFOSR-84-0817TR) Avail: NTIS HC A02/MF A01 CSCL 20/11

A system is subject to shocks which cause the system to deteriorate. In previous studies, distribution properties of such systems are discussed for different types of deterioration processes. At best these processes are right continuous Markov processes. Our interest in this paper is to tackle a related but different problem: we assume that the normal cost of running the system is a per unit of time and that each shock to the system increases the running cost by c per unit of time. The cost of completely replacing the system is c sub 0. The system is to be completely replaced at times T, 2T, ..., . Such replacement policies are known as periodic replacement policies. Since each shock weakens the system and makes it more expensive to run, it is desireable to determine a replacement time for the system. Boland and Proschan (4) consider periodic replacement of the system and give sufficient conditions for the existence of an optimal finite period, assuming that the shock process is a non-homogeneous Poisson process and the cost structure is time dependent, still requiring that the shock process is a nonhomogeneous Poisson process. We show, via a sample path argument, that the results of (3) and (4) hold for any counting process whose jump size of one unit magnitude. GRA

N85-12375# California Univ., Livermore. Lawrence Livermore Lab.
COMPUTER MOLECULAR DYNAMICS OF 2-D WATER (ICE) STRUCTURES UNDER SHOCK Status Report
P. Harris (Army Armament, Munitions and Chemical Command, Denver, N.J.) and A. M. Karo Aug. 1984 28 p
(Contracts N00014-84-F-0094; W-7405-eng-48)
(AD-A145818; UCID-20137) Avail: NTIS HC A03/MF A01 CSCL 08/12

Computer molecular dynamics has been used to study the shock-front transition region for a series of two-dimensional hydrogen-bonded structures composed of water-vapor molecules. Two different structures were examined and different intermolecular potential were considered. Sample sizes and running times were chosen to correspond to the predicted shock-front rise-time in real water. In this way the effect of different potentials and initial structures on the equilibration associated with the shock-front transition in water could be investigated. In addition to studying the development and incipient relaxation of shock-polarization states, the propagation and possible incipient relaxation of structural phase transitions occurring in two-dimensional structures was also considered. The results of these molecular dynamics calculations are compared with the experimental shock behavior of real water; in particular, comparisons are made with respect to intermolecular hydrogen-bond breaking, dissociation, and dissociation-related electrical conductivity data. GRA

N85-12376# George Washington Univ., Washington, D.C. School of Engineering and Applied Science.
FATIGUE CRACK PROPAGATION IN METASTABLE TITANIUM ALLOYS Technical Report, 31 Mar. 1982 - 31 Sep. 1983
S. H. Yang, A. Raith, C. M. Gilmore, and M. A. Imam Jul. 1984 39 p
(Contract N00019-82-C-0170)
(AD-A145824; GWU-CMEE-TR-84-1) Avail: NTIS HC A03/MF A01 CSCL 20/11

The fatigue crack growth rate tests of water quenched Corona-5 (Ti-4.5Al-1.5Cr-5Mo) and Ti-6Al-4V alloy were conducted in air at room temperature. The effect of the presence of the metastable retained beta phase on the fatigue crack growth rate was examined in this research. The specimens were heat treated and water quenched to have unstable beta phase that could be transformed to martensite during the fatigue crack growth testing. As quenched specimens were compared with specimens in the mill annealed condition. The fatigue crack growth rates of all the specimens were in the same order of magnitude regardless of the heat treatment. From this research it was shown that in Corona-5 and Ti-6Al-4V alloys the fatigue crack growth rates were not affected by the strain induced martensitic transformation. GRA

N85-12377# Army Armament Research and Development Command, Watervliet, N. Y. Large Caliber Weapon Systems Lab.
STRESS INTENSITY FACTORS FOR A CIRCULAR RING WITH UNIFORM ARRAY OF RADIAL CRACKS OF UNEQUAL DEPTH Final Report
S. L. Pu Jun. 1984 35 p Presented at 2nd Conference, Applied

Mathematics and Computing, 22-24 May 1984, Troy, N.Y.
(AD-A145893; AD-E440252; ARLCB-TR-84021) Avail: NTIS HC A03/MF A01 CSCL 20/11

The plane problem of a uniform array of unequal depth radial cracks originating at the internal boundary of a pressurized circular ring is considered. The 12-node quadrilateral isoparametric elements with collapsed singular elements around crack tips are used to compute stress intensity factors at crack tips. In a previous study of equal depth radial cracks, the weakest configuration is a ring with two diametrically opposed cracks. The current study shows that if for any reason one of the two cracks should grow a little faster than the other, the stress intensity factor at the tip of the longer crack increases at a much faster rate to enhance the faster growth of the longer crack. Numerical results are also obtained for cases of three and four radial cracks. It shows the same trend that once one or two cracks grow a little more than the rest, the stress intensity factors at these deeper cracks will be increased progressively higher to keep the faster pace of growth. This explains why the failure caused by a single major crack has been observed most frequently. A simple linear relation is assumed in this report between the stress intensity ratio and the crack depth ratio. This approximation enables us to estimate stress intensity factors at unequaled depth cracks by a method of total differentials. The estimations thus obtained are close to stress intensity factors computed from the finite element. GRA

N85-12378# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Structures Lab.
DYNAMIC SHEAR FAILURE OF SHALLOW-BURIED FLAT-ROOFED REINFORCED CONCRETE STRUCTURES SUBJECTED TO BLAST LOADING Final Report
T. R. Slawson Apr. 1984 319 p
(DA Proj. 4A7-62719-AT-40; DNA Proj. Y99-QAXS)
(AD-A145974; AD-F300465; WES/TR/SL-84-7) Avail: NTIS HC A14/MF A01 CSCL 18/3

Five box structures with span-to-depth (L/d) ratios of 10, 1 percent reinforcement in each face, and concrete strengths of approximately 4000 and 6000 psi, and six box structures with L/d ratios of 7, concrete strength of approximately 7000 psi and steel percentages of 1.2 and 0.75 percent, were tested dynamically at depth of burial equal to L/5. The dynamic overpressure simulated the peak overpressure, rate of pressure decay, and load duration associated with nuclear detonation and was generated using high-explosive primacord in a Foam HEST charge cavity configuration placed over the structure at the ground surface. Results of these tests indicate that current dynamic shear failure criteria significantly underpredict the dynamic shear strength of these structures. Author (GRA)

N85-12379# New Mexico Univ., Albuquerque. Bureau of Engineering Research.
THERMOMECHANICAL CRACKING IN LAYERED MEDIA FROM MOVING FRICTION LOAD
F. D. Ju Jul. 1984 95 p
(Contract N00014-84-K-0252)
(AD-A146022; ME-128(84)ONR-233-2) Avail: NTIS HC A05/MF A01 CSCL 12/1

This investigation studies a two-dimensional model of a layered medium subjected to the frictional excitation of a high-speed asperity traversing over the surface of the medium. The general analytical solutions of the mechanical stress state, the temperature field and the thermal stress state are obtained and expressed in the Fourier transform expressions. Numerical solutions are carried out for cases of uniform and parabolic pressure distributions. The resulting stress state yields the conditions for the asperity to initiate cracks in the layered medium. This paper studies, further, the thickness effect of the surface layer, the effect of relative stiffness of the surface layer and the substrate, and the effect of an insulating layer versus a conductive layer. Author (GRA)

N85-12380# Duke Univ., Durham, N. C.
DISPERSION FORCES OF SOLIDS UNDER STRESS. CHEMISORPTION UNDER STRESS Final Report, 1 Jul. 1977 - 14 May 1984
M. Ciftan and L. C. Biedenharn Aug. 1984 11 p
(Contract DAAG29-79-D-1001; Grant DAAG29-77-G-0184)
(AD-A146171; ARO-15385.10-PH; ARO-17939.5-PH) Avail: NTIS HC A02/MF A01 CSCL 07/4

The objective of the research summarized here was to determine the stress dependence of the chemical potential of atoms chemisorbed to metal surfaces. We have developed a new band theory of crystalline solids that is general, i.e., can be applied to all crystalline solids. We are now in the process of improving the numerical computational capacity of our software and computer system so that we can then go into the next phase: the introduction of a surface into the theory to get back to the phenomenon we started from, namely chemisorption on solid crystalline solids under stress. GRA

N85-12381# New Mexico Univ., Albuquerque. Bureau of Engineering Research.
THERMOMECHANICAL CRACKING DUE TO MOVING FRICTIONAL LOADS Final Report
F. D. Ju and J. H. Huang May 1984 191 p
(Contract N00014-76-C-0071)
(AD-A146271; ME-125(84)ONR-414-2) Avail: NTIS HC A09/MF A01 CSCL 12/1

The investigation uses several mathematical models to study the possibility of fracture initiation by dry friction and the configuration of fracture. The general study of friction cracking has a special application in marine seals. The purpose of this study is to extend our understanding of the problem by looking into the thermomechanical state of stress in a mechanical part resulting from the traversing of a single asperity or periodic asperities over its surface. The understanding of such a failure process could be used to improve the design of devices such as marine seals by alleviating the problem of friction cracking. GRA

N85-12382# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
INFLUENCE OF CYCLIC TANGENTIAL LOADING ON INDENTATION FRACTURE M.S. Thesis
M. C. Lu May 1984 71 p refs
(Contract DE-AC03-76SF-00098)
(DE84-015969; LBL-17693) Avail: NTIS HC A04/MF A01

An indentation method is used to analyze the contact damage induced by cyclic tangential loading in the partial slip condition. Failure strengths are measured thereafter to indicate the degree of damage. The phenomenon of crack propagation during cyclic loading is demonstrated to occur and has been attributed to the development of residual stress fields, induced by cyclic plasticity. The principal stresses and effective shear stresses are also calculated to predict the crack geometry and the nucleation of plastic deformation. These analyses conclude that the contact damage increases as the loading ratio and the number of cycles increase. DOE

N85-12383# Centre d'Essais Aeronautique Toulouse (France). Lab. d'Etudes de Materiaux Metalliques.
TENSILE AND CRACK PROPAGATION TESTS ON ALUMINUM ALLOYS OF THE 2000 AND 7000 SERIES IN LAMINATED PLATE AND FORGED PRODUCTS [ESSAIS DE TRACTION DE TENACITE ET DE PROPAGATION DE FISSURE SUR ALLIAGES D'ALUMINIUM DES SERIES 2000 ET 7000 SOUS FORME DE PRODUITS LAMINES ET FORGES. PROCES VERBAL DE L'ESSAI NO. M2-678300]
13 Jun. 1984 105 p refs In FRENCH
(M2-678300) Avail: NTIS HC A06/MF A01

Tensile and fatigue tests were carried out as a part of a characterization program of aircraft construction materials. The analysis of the results shows an influence of plate width on the mechanical characteristics. Microphotographs are presented to illustrate the fracture characteristics and the crack propagation. Author (ESA)

N85-12384# Centre d'Essais Aeronautique Toulouse (France). Lab. M4m.
THE TA6Zr5D (IMI 685) CHARACTERIZATION IN STRAIN CONTROLLED TESTS. (SPECIMENS OBTAINED FROM A FORGED SPINNING WHEEL) NO. M4-45870 [TA6ZR5D (IMI 685) COMPLEMENT DE CARACTERISATION EN DEFORMATION IMPOSEE (EPROUVETTES PRELEVEES DANS UN ROUET FORGE). PROCES VERBAL DE L'ESSAI NO. M4-458700]
8 Jun. 1984 22 p In FRENCH
(M4-45870) Avail: NTIS HC A02/MF A01

Low cycle strain controlled fatigue tests were performed on 16 specimens of the IMI 685 alloy in order to select the construction material for aircraft engine parts. The results show fatigue characteristics which are clearly lower than those corresponding to the IMI 679 alloy. The difference at 10000 cycles is 100 MPa at 200 C and 200 MPa at 425 C. Author (ESA)

N85-12385# United Kingdom Atomic Energy Authority, Harwell (England). Materials Physics and Metallurgy Div.
ETA VALUES FOR COMPACT GEOMETRY SPECIMENS TO CALCULATE THE J INTEGRAL
G. P. Gibson Jun. 1984 13 p refs
(AERE-R-11126) Avail: NTIS HC A02/MF A01

In determinations of elastic/plastic fracture toughness the eta factor relates the J integral to the area under the load versus load-time displacement trace. In the case of the compact geometry eta is generally equated to the plastic eta value (eta sub p), for which three analytical solutions were previously suggested. The approaches used to derive these solutions are discussed and compared with experimentally determined eta values. B.G.

N85-12386# United Kingdom Atomic Energy Authority, Harwell (England). Metallurgy Div.
AN EXPERIMENTAL EVALUATION OF THE J INTEGRAL IN 50% SIDEGROOVED COMPACT GEOMETRY SPECIMENS
G. P. Gibson, M. Wilmshurst (Polytechnic of Sunderland, England), and S. G. Druce May 1984 22 p refs
(AERE-R-11202) Avail: NTIS HC A02/MF A01

In experiments to measure fracture toughness, the J integral is conventionally determined from the area under the load versus displacement trace, the remaining ligament area and the eta factor. The Merkle and Corten solution is generally used for the eta factor for non-side grooved compact geometry specimens. This paper describes an investigation of the effect of side grooving a compact geometry specimen by 50%, on the J determination. The results show that a correction to the conventionally calculated J value should be made, due to changes in the plastic eta value, eta p, and the plastic deformation in the specimen flanks. Outside the linear-elastic regime this correction factor is 0.76. Author

N85-12387# United Kingdom Atomic Energy Authority, Harwell (England). Materials Physics and Metallurgy Div.
A COMPARISON OF METHODS FOR PREDICTING DUCTILE CRACK GROWTH INSTABILITY
G. P. Gibson and S. G. Druce May 1984 37 p refs
(AERE-R-11199) Avail: NTIS HC A03/MF A01

Two approaches have been suggested to predict the conditions for instability resulting from ductile crack propagation from a pre-existing defect. These are the T approach of Paris et al., and the I approach of Turner. The Paris T approach is based on the stability of the equilibrium state between the applied value of the J integral and the J versus crack extension material resistance curve. Under linear elastic conditions instability may be interpreted as occurring when the second differential of available energy exceeds that required for crack extension. The Turner approach, on the other hand, is based on the balance between the energies available and required for crack extension. A comparison of the two approaches has been carried out by re-analyzing the instability results of Paris et al., obtained using single-edge-notched, three-point bend specimens under conditions where the J integral can be considered as a crack tip field characterizing parameter. Under these conditions both approaches, although based on different assumptions, are numerically similar and the predicted conditions for instability are in good agreement with experimental results. B.W.

N85-12388# United Kingdom Atomic Energy Authority, Harwell (England). Metallurgy Div.
STRESS RELIEF CRACKING STUDIES OF 2 1/4Cr1Mo STEEL
C. A. Hippsley and B. C. Edwards Jan. 1984 30 p refs
(AERE-R-11111) Avail: NTIS HC A03/MF A01

The stress relief cracking susceptibility of coarse grained heat affected zone microstructures of 2 1/4 Cr 1Mo steel has been assessed using a recently developed constant displacement stress relief cracking test procedure. Two types of test are described: the relaxation test which simulates conditions of stress, strain and temperature during the post weld heat treatment cycle, and the load shedding test which characterizes crack growth behavior in terms of the stress intensity parameter at constant temperatures in the stress relief thermal cycle. Particular attention has been directed at characterizing the micromechanisms of cracking and the role of residual impurities. Two distinct types of stress relief cracking were identified: failure at high temperatures, > 875K, was characterized by intergranular ductile microvoid coalescence, whereas at lower temperatures, 725K-875K, a low ductility intergranular failure was produced with the cracking promoted by solute segregation to the grain boundaries and the crack tip region. An increase in the heating rate during the post weld heat treatment was shown to be beneficial to cracking resistance. The application of the laboratory test data to the prediction of stress relief cracking of actual weldments is considered, using two alternative methods. Author

N85-12250# Joint Publications Research Service, Arlington, Va.
FEATURES OF PLASTIC DEFORMATION AND FRACTURE OF EP 741 NICKEL ALLOY UNDER THERMAL STRAIN Abstract Only
L. P. Gerasimova, M. A. Godovanets, V. F. Kotov, L. Ye. Popova, and V. I. Shvarts *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 19 Transl. into ENGLISH from Poroshkovaya Met. (Kiev), no. 5, May 1984 p 51-57 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

N85-12261# Joint Publications Research Service, Arlington, Va.
STRUCTURE AND DUCTILITY OF FRACTURE OF JOINTS PRODUCED BY ELECTRON-BEAM WELDING OF VT6ch TITANIUM ALLOY PARTS Abstract Only
V. I. Trefilov, Ye. V. Turtsevich, S. M. Gurevich, and A. D. Shevelev *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 32 Transl. into ENGLISH from Avtomat. Svarka (Kiev), no. 5, May 1984 p 38-40 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

N85-12262# Joint Publications Research Service, Arlington, Va.
CAUSES OF STRENGTH REDUCTION IN WELDED TITANIUM-STEEL JOINTS Abstract Only
L. N. Larikov, M. N. Belyakova, A. A. Bibikin, V. N. Zmakov, and L. S. Kireyev *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 33 Transl. into ENGLISH from Avtomat. Svarka (Kiev), no. 4, Apr. 1984 p 17-29 and 22 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

N85-12266# Joint Publications Research Service, Arlington, Va.
STUDY OF DEFORMATION AND FRACTURE OF AMg6N WELDABLE ALUMINUM ALLOY BY METHOD OF ACOUSTIC EMISSION Abstract Only
Tikhiy, D. G. Borshchevskaya, G. A. Bigus, T. Ya. Evina, and T. N. Bogomaz *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 40 Transl. into ENGLISH from Avtomat. Svarka (Kiev), no. 5, May 1984 p 9-12 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

42 GEOSCIENCES (GENERAL)

N85-12389 Ceskoslovenska Akademie Ved, Prague. Inst. Geophysiques de l'Academie Tchecoslovaque des Sciences.
GEOPHYSICAL WORKS DURING 1981, VOLUME 29, NO. 547-566 [TRAVAUX GEOPHYSIQUES 1981, 29, NO. 547-566]
1984 399 p refs
Copyright. Avail: Issuing Activity

Twenty articles addressing various topics in geophysics are presented. The subject areas covered include: seismology and earthquakes, geomagnetic pulsations, magnetic and electrical properties of volcanic rocks, the attenuation and propagation of ULF waves in the ionosphere, and terrestrial heat flow. For individual titles, see N85-12390 through N85-12409.

N85-12390 Ceskoslovenska Akademie Ved, Prague. Geophysical Inst.
EARTHQUAKE ACTIVITY IN THE BOHEMIAN MASSIF AND IN THE WESTERN CARPATHIANS c46
Vit Karnik, Zdenka Schenkova, and Vladimir Schenk *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 9-33 refs (For primary document see N85-12389 03-42)
(Rept-547) Avail: Issuing Activity

The information on earthquake activity in two different tectonic units of central Europe, the Bohemian massif and the western Carpathians, is evaluated in terms of epicentre and intensity maps and intensity recurrence graphs. Additionally, the neighboring earthquake regions causing the largest macroseismic effects in the Bohemian massif and in the western Carpathians are also discussed. Finally, a scheme is compiled showing the correlation between earthquake occurrence and tectonic characteristics.
Author

N85-12391 Karlova Univ., Prague (Czechoslovakia). Inst. of Geophysics.
SPECIFIC PHENOMENA ASSOCIATED WITH THE PROPAGATION OF SEISMIC WAVES IN CENTRAL EUROPE c46
Jaromir Jansky, Jaroslava Plomerova (Ceskoslovenske Akademie Ved, Prague), Libuse Ruprechtova (Ceskoslovenske Akademie Ved, Prague), and Vladislav Babuska (Ceskoslovenske Akademie Ved, Prague) *In* Ceskoslovenske Akademie Ved Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 35-50 refs (For primary document see N85-12389 03-42)
(Rept-548) Avail: Issuing Activity

The station corrections at Pruhonice, Praha and Kasperske Hory do not depend on the orientation of the subsurface structures of the uppermost crust below the stations, they have no frequency dependence, but various time instabilities caused by the instrumental effects. Also the anomalously small vertical components of waves recorded at Pruhonice are caused by an incorrect intrinsic instrumental parameter. Regional dependence of the magnitude corrections correlate well with the strike and dip of the sinking lithosphere plates at focal regions. Only the magnitude calibrating function for the Sg waves is stable enough to be recommended for the magnitude determination of weak near earthquakes. The velocities derived from the local travel times constructed for the northward and the north-eastward directions of the seismic wave propagation to the Bohemian massif are higher than the standard travel times. The depth and distance dependence of the calibration function and of the time differences was analyzed for each PKP branch separately and checked on the data for other epicenter zones and observatory net. The theoretical seismograms for PKP (refracted) waves were computed by the method of replacing them by a sum of the seismograms of fictitious waves reflected on the discontinuities in a special model of the Earth's interior. It is shown that the propagation of the PKP(BC) branch to the distances of about 156 deg may be explained by the diffraction effect.
Author

N85-12392 Scientific Coal Research Inst., Ostrava (Czechoslovakia).
HOLE SHOTS ALONG REFRACTION PROFILE R4/78 RECORDED AT THE TEMPORARY SEISMIC STATION NEAR STARY PLZENEC (WEST BOHEMIA) c46
Karel Holub *In* Ceskoslovenske Akademie Ved Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 51-69 refs (For primary document see N85-12389 03-42)
(Rept-549) Avail: Issuing Activity

The temporary seismic station Stary Plzenec (SPC) recorded explosions fired at 6 shot points (SP) along the refraction profile R4/78. By transforming the arrival times of wave groups into the line of the profile in dependence on distance between the shot points and the seismic station, the travel-time curves of body and surface waves were obtained. The velocities of refracted waves, determined from these travel-time curves, can be considered to be apparent velocities, dependent on the slope of the boundary. The seismic effect of the individual explosions and the stability of the shot points were investigated by determining the dependence between the absolute peak-to-peak amplitudes of displacement and the size of the charges used. The dependences were approximated by an exponential function in the form A = kQ(n). The observations were used to determine the values of the exponent for various wave groups. The varying geological structure along the profile in both directions from the temporary seismic station affected the character of the decrease of the amplitudes of the first onsets of the P-waves with distance, which can be described by an exponential function of the form A = A sub 0 r(-m). For the region of Palaeozoic sediments m = 1.89 + or - 0.09, whereas for the region of the Algonkian m = 2.86 + or - 0.76.
Author

N85-12393 Ceskoslovenska Akademie Ved, Prague. Geophysical Inst.
IN SITU EXPERIMENT ON SHEAR WAVES GENERATION AND DETERMINATION OF ELASTIC PROPERTIES OF SOILS c46
Vladimir Schenk and Bohuslav Ruzek (Karlova Univ., Prague) *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 71-102 refs (For primary document see N85-12389 03-42)
(Rept-550) Avail: Issuing Activity

The generation, detection, and interpretation of shear waves are examined within the context of engineering seismology. Emphasis was placed on the problem of selecting a suitable source of shear waves and determining the probability of detection with increasing distance from the source. The velocity ratios of both transverse and longitudinal waves are determined along with the distribution of the values of Young's modulus of elasticity and of Poisson's constant along the investigated profile.
M.G.

N85-12394 Karlova Univ., Prague (Czechoslovakia). Inst. of Geophysics.
SEISMOLOGY IN ROCKBURST RESEARCH c46
Jiri Buben, Vladimir Rudajev (Ceskoslovenske Akademie Ved, Prague), and Petr Fucik (Ceskoslovenske Akademie Ved, Prague) *In* Ceskoslovenske Akademie Ved Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 103-118 refs (For primary document see N85-12389 03-42)
(Rept-551) Avail: Issuing Activity

Conditions of rock bursts origination are discussed and measuring of methods for some parameters of a rock massif, which are significant for classification of its stress state, are described. Statistical methods of predicting rock bursts are described and some estimates of the parameters of rock burst foci are presented.
E.A.K.

N85-12395 Ceskoslovenska Akademie Ved, Prague. Geophysical Inst.
STANDARDIZATION OF AMPLITUDE CHARACTERISTICS OF GALVANOMETRIC SEISMOGRAPHS IN THE KAPG NETWORK c46
Vladimir Tobyas *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 119-126 refs (For primary document see N85-12389 03-42)

(Rept-552) Avail: Issuing Activity

The calculating procedure for seismograph constants for short and intermediate period seismographs with standard characteristics is described. The effect of particular parameters on magnification is presented. E.A.K.

N85-12396 Ceskoslovenska Akademie Ved, Prague. Geophysical Inst.

SVKD AND SVKM-3 SEISMOGRAPHS WITH A LOW-SENSITIVITY CHANNEL c46

Vladimir Tobyas *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 127-142 refs (For primary document see N85-12389 03-42)

(Rept-553) Avail: Issuing Activity

The conditions for optimizing the constants of the additional low sensitivity channel in seismographs with galvanometric recording are derived and the accuracy of the constants and the magnification of the vertical SKD and SKM-3 seismographs at the Pruhonice (PRU) seismic station are analyzed. E.A.K.

N85-12397 Ceskoslovenska Akademie Ved, Prague. Geophysical Inst.

SHORT-PERIOD SEISMOGRAPH SVSN-6 c46

Vladimir Tobyas *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 143-154 refs (For primary document see N85-12389 03-42)

(Rept-554) Avail: Issuing Activity

The fundamental parameters of the short period electrodynamic seismograph SVSN-6 with galvanometric recording are given. The instrument has been in permanent operation at the Pruhonice seismic station (PRU) since 1961. The high degree of magnification of 210 000 at the period of 0.33 s was achieved by using a nonnegligible coupling coefficient. The errors in the seismograph magnification are derived from the estimates of the accuracy of setting the individual parameters and from the changes of the parameters during operation. E.A.K.

N85-12398 Ceskoslovenska Akademie Ved, Prague. Geophysical Inst.

CATALOGUE OF EARTHQUAKES FOR THE TERRITORY OF CZECHOSLOVAKIA FOR THE PERIOD 1957 - 1980 c46

Vit Karnik, Dana Prochazkova, and Ivan Broucek (Slovak Academy of Sciences, Bratislava) *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 155-186 refs (For primary document see N85-12389 03-42)

(Rept-555) Avail: Issuing Activity

The earthquake catalogue for 1957 to 1980 is the continuation of the main catalogue published in 1957 for the territory of Czechoslovakia. The earthquake information is arranged chronologically in the same way as in the main catalogue; for each event the basic parameters are given date, origin time, epicenter coordinates, epicentral intensity, magnitude, for some even,ts focal depth and radii of isoseismals. Macroseismic effects are described and shaken localities are listed. Fourteen isoseismal maps for events which have not yet been published elsewhere are included. E.A.K.

N85-12399 Ceskoslovenska Akademie Ved, Prague. Geophysical Inst.

STATISTICAL PROPERTIES OF GEOMAGNETIC PULSATIONS AT THE OBSERVATORY OF FUERSTENFELDBRUCK DETERMINED WITH THE AID OF PULSATION INDICES. PART 2: PERIODICITY IN THE OCCURRENCE OF PULSATIONS c46

Jaroslav Strestik *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 187-202 refs (For primary document see N85-12389 03-42)

(Rept-556) Avail: Issuing Activity

The records of the Furstenfeldbrock observatory (FRG) for the years of 1960-1971 were processed using the method of pulsation indices, based on the mean diurnal amplitude of the pulsations in the frequency ranges Pc2, Pc3, Pc4 and Pc5. The variation in the occurrence of pulsations in the course of the solar cycle, the seasonal variational variation and the periods associated with the Sun's rotation were studied for pulsations in all frequency ranges and in both horizontal components. Long-term variations were determined for calm as well as disturbed days. The changes of periodicities in the course of the solar cycle were investigated. The ratio of the intensities of the annual and the semi-annual variations, as well as the ratio of the intensities of the 27-day variation and of variations with shorter periods were studied. The periodicities were determined with the aid of power spectra and expressed graphically. Author

N85-12400 Ceskoslovenska Akademie Ved, Prague. Geophysical Inst.

MAGNETIC CHARACTERISTICS OF SOME VOLCANIC ROCKS OF THE WEST CARPATHIANS c46

Vladimir Kropacek and Tomas Zelinka *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 203-216 refs (For primary document see N85-12389 03-42)

(Rept-557) Avail: Issuing Activity

The magnetic characteristics and hysteresis curves of young volcanic rocks of the west Carpathians of the calc-alkaline series (rhyolite-rhyodacite-andesite-andesitic basalt) and of the alkaline rocks of the west Carpathians are studied. The results obtained are used in an attempt to determine the effect of the ferrimagnetic component and of the paramagnetic skeleton of the rock on the magnetic properties of the rocks under study. Author

N85-12401 Ceskoslovenska Akademie Ved, Prague. Geophysical Inst.

ELECTRIC PROPERTIES OF NEOVOLCANIC ROCKS OF CENTRAL AND EAST SLOVAKIA c46

Marcela Lastovickova *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 217-233 refs (For primary document see N85-12389 03-42)

(Rept-558) Avail: Issuing Activity

The temperature dependences of the electric conductivity of volcanic rocks of the calc-alkaline series from central and east Slovakia were studied in the internal of 200 to 1000 C. The observed regularities were explained on the basis of the chemical composition of the rocks investigated. Author

N85-12402 Ceskoslovenska Akademie Ved, Prague. Geophysical Inst.

CHARACTERISTICS OF ABSORPTION AND FREQUENCY FILTRATION OF ULF ELECTROMAGNETIC WAVES IN THE IONOSPHERE c46

Karel Prikner *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 235-253 refs (For primary document see N85-12389 03-42)

Avail: Issuing Activity

The method of interpreting the results of the problem of vertical propagation of ULF waves through the inhomogeneous magneto-active Earth's ionosphere, treated by means of the method of R-T coefficients, is expanded. The characteristics of transmissivity, reflectiveness and absorption in a limited ionospheric layer are derived. With the aid of the characterisics, which respect the relation between the wave generated at the Earth's surface and the total wave above the considered ionospheric layer, it is possible to study the frequency dependence of the absorption of electromagnetic energy and the frequency-selective amplitude filtration of waves in this layer. This method is another suitable aid in the wave diagnostics of the ionosphere and lower magnetosphere in relation to the generation of geomagnetic pulsations at the Earth's surface and in the magnetosphere. Author

N85-12403 Ceskoslovenska Akademie Ved, Prague. Geophysical Inst.

SEASONAL VARIATIONS OF REFLEXIBILITY AND TRANSMISSIBILITY OF ULF WAVES PROPAGATING THROUGH THE IONOSPHERE OF GEOMAGNETIC MID-LATITUDES c46

Karel Prikner *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 255-283 refs (For primary document see N85-12389 03-42)

(Rept-560) Avail: Issuing Activity

Using reference models of the daytime and night ionosphere of geomagnetic mid-latitudes in a quiescent period in summer, autumn and winter, the seasonal variation of ULF frequency characteristics of amplitude and energy correction factors of the ionosphere - vertical reflexibility, transmissibility, are studied. The existence of two frequency bands within the ULF range with different properties of ionospheric wave filtration is pointed out: (1) continuous band $f < 0.1$-0.2 Hz with the mirror effect of the ionosphere with respect to the incident wave, but with small ionospheric absorption of wave energy; (2) the $f > 0.2$ Hz band with resonance frequency windows and wave emissions with a sharply defined frequency structure. The seasonal variation from summer to winter indicates a decrease in wave energy absorption in the ionosphere and a slight displacement of the resonances towards higher frequencies. Author

N85-12404 Ceskoslovenska Akademie Ved, Prague. Geophysical Inst.

RESPONSE OF THE F2 LAYER TO THE POLARITY OF THE INTERPLANETARY MAGNETIC FIELD c46

Ludmila Triskova *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 285-294 refs (For primary document see N85-12389 03-42)

(Rept-561) Avail: Issuing Activity

The analysis of the data from 13 northern and 6 southern ionospheric stations indicates that the response of the F2 layer to the polarity of the IMF is the consequence of changes of magnetic activity caused by the condition of the IMF. It is manifested most expressively during the equinox at night critical frequencies. The data from the maxima of the 19th, 20th, and 21st solar cycles were processed. R.S.F.

N85-12405 Ceskoslovenska Akademie Ved, Prague. Geophysical Inst.

HEAT FLOW MAP OF EUROPE: BRIEF SUMMARY OF THE GEOPHYSICAL IMPLICATIONS c43

Vladimir Cermak *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 295-314 refs (For primary document see N85-12389 03-42)

(Rept-562) Avail: Issuing Activity

The map of the surface heat flow in Europe was supplemented with the crustal thickness pattern; data on crustal radioactivity and conductivity; and available information on tectonic age and heat flow, heat generation and heat flow, and crustal thickness relationships. Using this material and discussing it in terms of the crustal structure, generalized one-dimensional steady state conductive temperature-depth curves were calculated for major tectonic provinces of Europe. Converting the seismic velocities to heat generation data, a preliminary pattern of the Moho heat flow was proposed. The characteristic geotherms were computed, using surface heat flow as the determining parameter. By equating the depth at which geotherms intersect the mantle solidus with the depth of the lithosphere base, the surface heat flow pattern was used to map regional variations of the lithospheric thickness. R.S.F.

N85-12406 Ceskoslovenska Akademie Ved, Prague. Geophysical Inst.

TERRESTRIAL HEAT FLOW IN EUROPE AND GENERAL FEATURES OF ITS REGIONAL DISTRIBUTION c43

Vladimir Cermak *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 315-324 refs (For primary document see N85-12389 03-42)

(Rept-563) Avail: Issuing Activity

The heat flow field in Europe is presented in the form of a simplified heat flow pattern. This map was based on more than 3000 existing heat flow measurements. These data were complemented by deep hole temperatures, temperature gradients, and local heat-flow patterns. The European region is generally characterized by large low heat-flow zones covering most of northern and eastern Europe, surrounded by normal to high heat-flow values spread in western, central, southern and southeastern Europe. This north-east to south-west increase of the geothermal activity in Europe is the consequence of the whole geological evolution and the major heat-flow provinces have to correspond roughly to the principal tectonic units of Ur-Europe, Palaeo-Europe, Meso-Europe, and Neo-Europe. A brief introductory description of the map is given together with some remarks on the problem of preparing the map, corrections to the measured heat-flow values, and mean heat flows in practically all individual European countries. R.S.F.

N85-12407 Ceskoslovenska Akademie Ved, Prague. Inst. of the Physics of the Atmosphere.

ON THE CO-VARIANT FORMULATION OF THE LAW OF MOTION OF PASSIVE PARTICLES IN A FIELD OF TURBULENCE c34

Jiri Horak *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 325-346 refs (For primary document see N85-12389 03-42)

(Rept-564) Avail: Issuing Activity

Tensor calculus in curvilinear coordinates is applied to the dynamics of particle transfer in a field of turbulence. The initial relation is the concept of the local interaction of a fluid particle and an admixture particle. This relation enters the deliberations by means of the covariant derivative of the Lagrangian velocities of the particle of the fluid, which connects the components of the metric tensor with the Lagrangian tensor of correlation of the second order. Thus, the problem is formulated in Reimann's covariants. The instability and the consequent state of the system with the property of mixing is the result of the curvature of Riemann's manifold and of the exponential divergence of the geodesics lying on it. Its non-stationary definite metric is in close relation to the spectral expression of the hypotheses of self-preservation. R.S.F.

N85-12408 Ceskoslovenska Akademie Ved, Prague. Inst. of the Physics of the Atmosphere.

ALGEBRA OF HYDRODYNAMIC FLOWS OF AN IDEAL FLUID AND THE PREDICTION OF THE BEHAVIOUR OF A SYSTEM OF PARTICLES OF A PASSIVE ADMIXTURE ON RIEMANN SURFACES WITH A VARIABLE CURVATURE c43

Jiri Horak *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 347-377 refs (For primary document see N85-12389 03-42)

(Rept-565) Avail: Issuing Activity

The model of the evolution of the state of a system of particles of a passive admixture is constructed under the assumption of stationary plane flow of an ideal fluid. A group of diffeomorphisms of the flow region, preserving the element of its volume, represents the configuration space of hydrodynamic flows. The relation between such a group and the hydrodynamics is based on the real motion of the fluid together with the particles of the passive admixture taking place along the geodesic of the group of diffeomorphisms with a right-invariant Riemann metric. The elements of Lie's algebra of groups are non-divergent vector fields and the elements of Lie's algebra of Lie's group represent a certain class of complex functions and the (real) flow functions they form. There exist geometric structures in which one cannot speak of a non-local prognostic model of the motion of particles of the fluid after the regions with negative curvature are defined. However, this does not concern their velocity, which may be stable in Lyapunov's sense, although the motion of the particles, generated by this field is (exponentially) unstable. R.S.F.

N85-12409 Ceskoslovenska Akademie Ved, Prague. Inst. of the Physics of the Atmosphere.

THE EXTREMENESS OF THE COLD FRONT OF DECEMBER 31, 1978 OVER THE CSR c47

Frantisek Rein and Josef Steki *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 375-404 refs (For primary document see N85-12389 03-42)

(Rept-566) Avail: Issuing Activity

An analysis from the subsynoptic point of view was carried out of the exceptionally intensive cold front of Dec. 31, 1978 and Jan. 1, 1979 over the territory of Czechoslovakia. The relation of

these processes to macro-synoptic processes is evaluated. Using observations of 185 stations the direction and velocity of penetration of the cold air is described. The synoptic conditions of cooling are compared with synoptic types from the years 1970 to 1977, described by pressure and temperature fields, under which subnormal temperatures are observed in Czechoslovakia. A method of forecasting subnormal temperatures is proposed using numerical forecasts of fields. The observed extreme gradients and the time variations of some elements are given. The temperature decrease is compared with the Prague-Klementinum series. R.S.F.

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N85-12410 Cornell Univ., Ithaca, N.Y.
REMOTE SENSING FOR LANDFORMS AND SOILS IN THE ARID SOUTHWEST UNITED STATES Ph.D. Thesis
William Ling Teng 1984 404 p
Avail: Univ. Microfilms Order No. DA8415424

This study was conducted to refine the genetic or landform approach to terrain analysis for soils investigations in the Las Cruces area of New Mexico, by characterizing in a more detailed and explicit manner the image interpretation elements for landform analysis (i.e., boundary, topography, drainage, erosion, tone, and vegetation/land use). Landform units were visually interpreted from 1:40,000 scale panchromatic and 1:112,000 scale color airphotos with stereoscopes, and from LANDSAT multispectral scanner (MSS) images through color active viewing. The delineated units were compared with each other and with published soil survey mapping units, using a geographic information system (Map Analysis Package). Based on the comparison results and field data, the generally accepted landform units in aid regions (i.e., alluvial fan, filled valley, playa, and sand dune) were subdivided into 23 refined units. Delineations from both scales of airphotos generally agreed well with each other and both generally agreed with delineations from soil survey maps. Dissert. Abstr.

N85-12411* National Aeronautics and Space Administration, Washington, D. C.
EARTH RESOURCES, A CONTINUING BIBLIOGRAPHY WITH INDEXES
Oct. 1984 136 p
(NASA-SP-7041(43); NAS 1.21:7041(43)) Avail: NTIS HC A07/MF A01 CSCL 05B

This bibliography lists 460 reports, articles and other documents introduced into the NASA scientific and technical information system between July 1 and September 30, 1984. Emphasis is placed on the use of remote sensing and geophysical instrumentation in spacecraft and aircraft to survey and inventory natural resources and urban areas. Subject matter is grouped according to agriculture and forestry, environmental changes and cultural resources, geodesy and cartography, geology and mineral resources, hydrology and water management, data processing and distribution systems, instrumentation and sensors, and economical analysis. E.A.K.

N85-12412*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ASSESSMENT OF COMPUTER TECHNIQUES FOR PROCESSING DIGITAL LANDSAT MSS DATA FOR LITHOLOGICAL DISCRIMINATION OF SERRA DO RAMALHO, STATE OF BAHIA [AVALIACAO DE TECNICAS DE TRATAMENTO FOR COMPUTADOR DE DADOS DIGITAIS MSS-LANDSAT NA DISCRIMINACAO LITOLOGICA NA SERRA DO RAMALHO, ESTADO DA BAHIA]
Waldir Renato Paradella, Principal Investigator, Icaro Vitorello, and Mario Dias Monteiro (Companhia Baiana de Pesquisa Mineral, Salvador, Brasil) Aug. 1984 35 p refs In PORTUGUESE; ENGLISH summary Presented at the 2nd Simp. Brasil. de Sensoriamento Remoto, Brasilia, 10-14 May 1982 Sponsored by NASA Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls., S. D. 57198 ERTS
(E85-10033; NASA-CR-174124; NAS 1.26:174124; INPE-3250-PRE/592) Avail: NTIS HC A03/MF A01 CSCL 08G

Enhancement techniques and thematic classifications were applied to the metasediments of Bambui Super Group (Upper Proterozoic) in the Region of Serra do Ramalho, SW of the state of Bahia. Linear contrast stretch, band-ratios with contrast stretch, and color-composites allow lithological discriminations. The effects of human activities and of vegetation cover mask and limit, in several ways, the lithological discrimination with digital MSS data. Principal component images and color composite of linear contrast stretch of these products, show lithological discrimination through tonal gradations. This set of products allows the delineations of several metasedimentary sequences to a level superior to reconnaissance mapping. Supervised (maximum likelihood classifier) and nonsupervised (K-Means classifier) classification of the limestone sequence, host to fluorite mineralization show satisfactory results. M.G.

N85-12413*# Miami Univ., Fla. School of Marine and Atmospheric Science.
CONTINENTAL AND OCEANIC CRUSTAL MAGNETIZATION MODELLING Semiannual Status Report
Christopher G. A. Harrison and K. L. Hayling [1984] 11 p refs ERTS
(Grant NAG5-414)
(E85-10034; NASA-CR-174125; NAS 1.26:174125) Avail: NTIS HC A02/MF A01 CSCL 08C

Inversion of magnetic data from the MAGSAT satellite, to arrive at intensities of magnetization of the Earth's crust, was performed by two different methods. The first method uses a spherical harmonic model of the magnetic field. The coefficients believed to represent sources in the Earth's crust can then be inverted to arrive at vertical dipole moments per unit area at the Earth's surface. The spherical harmonic models contain coefficients of degrees of harmonics up to 23. The dipole moment per unit area for a surface element can then be determined by summing the contribution for each individual degree of harmonic. The magnetic moments were calculated for continental and oceanic areas separately as well as over certain latitudinal segments. Of primary concern was to determine whether there are any differences between continental and oceanic areas. The second analysis with magnetization intensities was made using narrower ranges of degrees of harmonics, assuming that higher degrees are present in the core field signal. M.G.

N85-12414*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
SPECIFICATION AND PRELIMINARY DESIGN OF THE CARTA SYSTEM FOR SATELLITE CARTOGRAPHY [ESPECIFICACAO E PROJETO PRELIMINAR DO SISTEMA CARTA PARA CARTOGRAFIA POR SATELITE]
Antonio Jose Ferreira MachadoeSilva, Principal Investigator, Fernando Augusto Mitsuo Ii, Gilberto Camara Neto, Paulo Roberto Martins Serra, and Ricardo Cartaxo Modesto Souza Aug. 1984 52 p refs In PORTUGUESE; ENGLISH summary Presented at the 36th Reuniao Anual da SBPC, Sao Paulo, 4-11 Jul. 1984 Sponsored by NASA
(E85-10035; NASA-CR-174126; NAS 1.26:174126; INPE-3256-PRE/593) Avail: NTIS HC A04/MF A01 CSCL 08F

Digital imagery acquired by satellite have inherent geometrical distortion due to sensor characteristics and to platform variations. In INPE a software system for geometric correction of LANDSAT MSS imagery is under development. Such connected imagery will be useful for map generation. Important examples are the generation of LANDSAT image-charts for the Amazon region and the possibility of integrating digital satellite imagery into a Geographic Information System. R.S.F.

N85-12415*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
EVALUATION OF CRITERIA FOR SELECTING THE SPECTRAL ATTRIBUTES OF DIGITAL LANDSAT MSS IMAGERY FOR DISCRIMINATING LITHOLOGICAL UNITS IN THE LOWER CURACA RIVER VALLEY, BAHIA [AVALIACAO DE CRITERIOS DE SELECAO DE ATRIBUTOS ESPECTRAIS DE IMAGENS DIGITAIS MSS-LANDSAT, EM DISCRIMINACOES LITOLOGICAS NO BAIXO VALE DO RIO CURACA, BAHIA]
Waldir Renato Paradella, Principal Investigator Aug. 1984 34 p refs In PORTUGUESE; ENGLiSH summary Submitted for publication Sponsored by NASA Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S. D. 57198 ERTS
(E85-10036; NASA-CR-174127; NAS 1.26:174127; INPE-3248-PRE/591) Avail: NTIS HC A03/MF A01 CSCL 08F

The use of spectral attributes criteria was investigated, based on measures of statistical distance of separability between thematic classes in MSS digital LANDSAT imagery, in order to select the best subsets of channels in composite colors for the detection and discrimination of lithological units in the lower valley of Curaca River, State of Bahia, Brazil. Three situations were investigated: (1) selection of the three best channels, considering all of the original bands (channels 4, 5, 6, and 7); (2) selection of the three best bands, considering the six MSS band-ratios (channels 4/5, 4/6. 4/7, 5/6, 5/7, and 6/7); and (3) selection of the three best bands in a hybrid approach (the four original bands and the six ratios). A visual analysis was done on color composite images using the selected sets. Results show that the hybrid product (bands 4, 5/7, and 7 with green, blue, and red respectively) and the Normal Color Composite (bands 4, 5, and 7 with blue, green, and red colors respectively) had the best performance. R.S.F.

N85-12416*# State Univ. of New York, Binghamton. Dept. of Geological Sciences.
EFFECTS OF THE OCEANS ON POLAR MOTION: CONTINUED INVESTIGATIONS Semiannual Status Report, Jan. - Jun. 1984
Steven R. Dickman, Principal Investigator Jun. 1984 12 p ERTS
(Grant NAG5-145)
(E85-10037; NASA-CR-174128; NAS 1.26:174128) Avail: NTIS HC A02/MF A01 CSCL 08E

Data on the pole tide, the oceanic response to the Chandler wobble were presented. Observed North Sea pole tide enhancement (i.e., larger amplitudes than a static tide would possess) resulted from bottom friction, with the drag coefficient, in combination with the depth of the North Sea decreasing southward. Computer programs were written for the boundary conditions. Dissipation of the energy by North Sea pole tide currents was also computed; preliminary results indicate that such dissipation may explain a significant fraction of Chandler wobble energy loss. B.G.

N85-12417*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
LANDAT-4/5 IMAGE DATA QUALITY ANALYSIS Quarterly Progress Report, 10 Aug. - 9 Nov. 1984
P. E. Anuta 9 Nov. 1984 5 p refs ERTS
(Contract NAS5-26859)
(E85-10039; NASA-CR-174131; NAS 1.26:174131; LARS-CR-110984) Avail: NTIS HC A02/MF A01 CSCL 08B

LANDSAT-4/5 data quality analysis was covered. Focus was on estimation of two-dimensional point-spread function estimation. A brief description is included. B.G.

N85-12418# Maine Univ., Orono.
USE AND VALUE OF A GEODETIC REFERENCE SYSTEM
E. F. Epstein and T. D. Duchesneau Apr. 1984 45 p refs
(Grant NA82AA-D-00016)
(PB84-216167; NOAA-84070907; LC-84-10169) Avail: NTIS HC A03/MF A01 CSCL 13B

A benefit cost framework is applied to the issue of identifying and assessing economic value arising from utilization of a geodetic reference system. The findings indicate that investment in utilization of a geodetic reference system yields a large stream of benefits to an agency or jurisdiction that typically requires accurate, compatible, spatial information for decision-making. The major portion of benefits occurs with the use of spatial information based on a geodetic system by secondary and tertiary users. In the context of economic value, a geodetic reference system can be viewed as an input to a production process. The outputs of this process are spatial information products with the attribute of universal compatibility. Universal compatibility allows users of the information products to combine or integrate across information products independently of the original purpose for which the information was produced. GRA

N85-12419# European Space Agency, Paris (France).
ERS-1 RADAR ALTIMETER DATA PRODUCTS
T. Guyenne, ed. and J. J. Hunt, ed. Aug. 1984 266 p refs Proc. of ESA Workshop, Frascati, Italy, 5-11 May 1984 Original contains color illustrations
(ESA-SP-221; ISSN-0379-6566) Avail: NTIS HC A12/MF A01

The ERS-1 (ESA satellite) wind, wave, sea ice, and topography data products were discussed. The altimeter off-line ground segment, and altimeter system design aspects were covered. For individual titles, see N85-12420 through N85-12457.

N85-12420# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
THE ESA REMOTE SENSING SATELLITE SYSTEM (ERS-1)
E. H. Velten *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 3-8 refs (For primary document see N85-12419 03-43) Avail: NTIS HC A12/MF A01

Mission objectives, spacecraft and payload support, payload instruments, instrument data handling and transmission, and ground segment of ERS-1 (ESA) are outlined. An active-microwave C-band instrument measures wind fields and wave image spectra and provides all-weather high resolution images of coastal zones, open oceans, ocean ice areas and images over land. A Ku-band radar altimeter measures significant wave-height, wind speed, and provides measurements over ice and major ocean currents. Laser retroreflectors for accurate satellite tracking from the ground, as a complement for the radar-altimeter, are included. An along-track-scanning radiometer with a microwave sounder, and the Precise Range and Range Rate Experiment complete the payload. Author (ESA)

N85-12421# European Space Agency, Paris (France).
THE ERS-1 RADAR ALTIMETER: AN OVERVIEW c19
C. R. Francis *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 9-16 refs (For primary document see N85-12419 03-43) Avail: NTIS HC A12/MF A01

The ERS-1 (ESA) radar altimeter implementation, parameter estimation, autocalibration, data flow, and operating principles are summarized. The microwave subsystem contains an ultrastable oscillator and a chirp generator. A traveling wave tube amplifier and its electronic power conditioner form the high power amplifier (the radar transmitter output). The signal processor subassembly has a spectrum analyzer and a microcomputer. The microcomputer also handles real time parameter estimation, with center of gravity tracking in the ice mode and suboptimal maximum likelihood estimation (SMLE) in the ocean mode. The curve-fitting SMLE is used in calibrating the signal path of the instrument to a precision of 0.7 nsec. Command and housekeeping data use an S band telemetry link, scientific data are delivered via X band, in real time and as a dump. Author (ESA)

N85-12422# Selenia S.p.A., Rome (Italy).
THE ERS-1 RADAR ALTIMETER INSTRUMENT c19
G. Levrini, F. S. Rubertone, and W. Ruehe (Dornier-Werke G.m.b.H., Friedrichshafen, West Germany) *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 17-22 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

The ERS-1 (ESA) radar altimeter system design parameters are discussed. Parameter tracking loops (time delay between transmitted pulse and return echo leading edge half power point; significant wave height; ocean reflectivity) are described. Hardware for the RF/IF signal processing sections is presented.
Author (ESA)

N85-12423# European Space Agency, Paris (France). Earthnet.
THE CURRENT FORMAL STATUS OF THE ERS-1 GROUND SEGMENT **c32**
G. Paci *In its* ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 23-28 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

Status of the ERS-1 ground segment is reported for the payload data facilities for acquisition of raw data; quasi real-time data processing and distribution; off-line data processing and distribution. The British, French, German, and Italian proposals for the off-line program are described. The off-line ground segment consists of facilities for payload data archive and retrieval; generation and dissemination of off-line products (precision and thematic); user interface tasks (catalog, order handling, quality control); and long-term payload evaluation. It also includes development of algorithms for the off-line products. Author (ESA)

N85-12424# Centre Oceanologique de Bretagne, Brest (France).
WIND SPEED DETERMINATION FROM RADAR ALTIMETERS **c47**
P. Queffeulou *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 31-35 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

Satellite radar altimeter wind speed determination is reviewed. The altimeter wind algorithm underestimates high wind speeds. The backscatter coefficient accuracy is shown to be a very important parameter for accurate wind speed estimation. For tuning algorithm coefficients with surface data, the temporal and spatial variability of wind at sea has to be carefully investigated.
Author (ESA)

N85-12425# Centre National d'Etudes Spatiales, Toulouse (France).
OCEAN WAVE PARAMETERS EXTRACTION USING SATELLITE SHORT-PULSE RADAR ALTIMETERS **c48**
N. M. Mognard *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 37-41 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

Measurement of significant wave height and surface wind speed by satellite-borne radar altimeter to infer other sea state parameters such as minimum significant swell height and wind wave spectra is discussed. Examples of minimum swell generation, propagation, and attenuation and wind wave spectra are shown, using data from the SEASAT radar altimeter. Author (ESA)

N85-12426# Service Meteorologique Metropolitan, Paris (France).
THE USE OF ALTIMETER DATA FOR SEA STATE FORECASTING **c48**
A. Guillaume *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 43-46 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

Sea state analysis and forecasting methods are reviewed, and the contribution of the ERS-1 (ESA) radar altimeter to sea state forecasting is discussed. It is shown that altimeter data can be used to elaborate a significant wave height (SWH) analysis, which at present is not possible because of lack of data or of their poor quality. But, as no spectra are available, it does not meet the analysis needs of forecasting models. The SWH data set collected by ERS-1 will be useful for model development, tuning, validating or comparison, and for climatological studies. Nevertheless, other means still remain necessary, as the efforts for a better understanding of basic phenomena in sea state evolution (nonlinear transfer, finite depth transformation, etc.) must be continued. Author (ESA)

N85-12427# Institute of Oceanographic Sciences, Wormley (England).
THE IMPACT OF SATELLITE ALTIMETER DATA ON WAVE RESEARCH **c48**
D. J. T. Carter and P. G. Challenor *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 47-50 refs Sponsored by UK Ministry of Industry and ESA (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

It is argued that the main contribution of satellite altimetry to ocean wave research will be in transferring attention from the time domain to spatial aspects of ocean waves, on long and short scales. Understanding of the sea surface over short distances, within the footprint of the altimeter, is essential for interpreting the altimeter return and this will influence work in short term wave statistics. On longer scales the altimeter data will provide information on the spatial scales of the ocean wave field and on wave climate over all the world's oceans. The influence of the altimeter on wave modelling is considered. Author (ESA)

N85-12428# Cambridge Univ. (England).
CRYOSPHERIC DATA PRODUCTS AVAILABLE THROUGH SATELLITE ALTIMETRY
V. A. Squire, D. J. Drewry, A. M. Cowan, and N. F. McIntyre (Mullard Space Science Laboratory) *In* ESA ERS-1 Radar Altimeter Data Products Aug. 1984 p 51-57 refs Sponsored by Natural Environmental Research Council of Great Britain, ESA, Navy and British Petroleum Co. (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

The extraction of glaciological parameters from satellite radar altimetry over continental ice and sea ice is discussed in the context of geophysical and oceanographic data products for applications and research use. Each parameter is discussed with reference to its scientific value and to difficulties which occur in processing. Although nontrivial to interpret, the altimeter waveform over ice-covered terrain or sea contains information which in many cases can be obtained by no other method. Author (ESA)

N85-12429# University Coll., London (England). Dept. of Electronic and Electrical Engineering.
SPECIAL DIFFICULTIES OF RETRIEVING SURFACE ELEVATION OVER CONTINENTAL ICE **c32**
H. D. Griffiths *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 61-65 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

Differences between radar returns from ice sheets and oceans are reviewed for the ERS-1 mission, and optimum organization of the satellite orbit repeat and ground segment data processing are discussed. To provide adequate cross-track slope information a long repeat cycle is desirable. However, to detect changes in elevation this only needs to be repeated infrequently. Ice sheet elevation measurements should be repeated with similar instruments at decade intervals. Waveform retracking is best carried out by a dedicated hardware processor, fitting one of a number of idealized profiles to the data to derive corrected range values. Corrected values of range rate could be calculated, as the first stage of correction of slope-induced error. The onboard computed range rate values from the alpha-beta tracker form a simple method of correcting along-track slope-induced error. Author (ESA)

N85-12430# Oxford Univ. (England).
REQUIREMENTS AND SPECIAL PROBLEMS OF LAND ALTIMETRY
J. G. Olliver *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 67-71 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

Land observations by altimeter satellites are discussed. Justification for undertaking such observations is given, and the technique for obtaining land data from altimeters designed for oceanographic investigation is described. Technical requirements for a dedicated land altimeter mission are discussed. The behavior of the altimeter over inland water surfaces is considered.
Author (ESA)

N85-12431# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
TRACKING REQUIREMENTS FOR PRECISE ERS-1 ORBIT DETERMINATION c13
K. F. Wakker and B. A. C. Ambrosius *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 73-78 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

Tracking equipment on ERS-1 and alternative tracking concepts are described. Orbit determination error analyses for a 3-day arc of tracking data acquired by global tracking networks are discussed. The orbit is not ideal for the investigation of the global ocean circulation. The Precise Range and Range Rate Experiment (PRARE) tracking is seriously handicapped if not more than the four currently approved systems are deployed. The major error source in computing multirevolution ERS-1 orbits is the Earth gravity field model. To achieve the highest orbit accuracy a tailored gravity model must be derived by processing the tracking data acquired during the first months in orbit. During this initial phase the tracking should be performed by the existing world-wide network of laser stations, augmented by 5 to 15 PRARE systems. Altimeter measurements should be used as tracking data. Author (ESA)

N85-12432# Bonn Univ. (West Germany). Inst. fuer Theoretische Geodaesie.
DETERMINATION OF GEOID UNDULATIONS AND OCEAN HEIGHTS FROM ERS-1 RADAR ALTIMETRY DATA
K. R. Koch *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 79-82 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

A method to separate satellite geodial heights from the time varying heights of the sea surface in the altimetry heights is outlined. The method is based on the frequency analysis of the altimetry data to detect the time varying heights and on crossover analysis augmented by a least squares filtering and prediction to determine the geoid undulations. The separation can only be achieved iteratively. Author (ESA)

N85-12433*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE NASA/JPL PILOT OCEAN DATA SYSTEM
J. W. Brown and J. C. Klose *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 85-89 refs Sponsored by NASA (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

The Pilot Ocean Data System was developed to investigate techniques for archiving and distributing ocean data obtained from space. The system includes a technique for efficient storage and rapid retrieval of satellite data, an easy-to-use user interface, and a variety of output products which, taken together, permit researchers to extract and use data rapidly and conveniently. A set of analysis tools together with convenient access to data enables the research community to understand and improve the data archives in ways which would not otherwise be feasible. Author (ESA)

N85-12434# Institute of Oceanographic Sciences, Birkenhead (England). Marine Information and Advisory Service.
INTERNATIONAL BANKING OF SATELLITE AND IN-SITU WAVE DATA BY THE MARINE INFORMATION AND ADVISORY SERVICES (MIAS) c82
M. T. Jones and A. R. Tabor *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 91-98 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

The role of the Marine Information and Advisory Service in the international cataloguing and banking of instrumentally collected wave data and its function as the Responsible National Oceanographic Data Centre (Waves) designated by the International Oceanographic Data Exchange Working Committee of the Intergovernmental Oceanographic Commission are described. Data holdings, and data banking and retrieval methods are outlined. Aspects of satellite-recorded wave data are examined, and suggestions for the way in which such data should be banked, indexed, and retrieved are proposed. Author (ESA)

N85-12435# Royal Aircraft Establishment, Farnborough (England).
FACTORS AFFECTING THE ARCHIVING, PROCESSING AND DISSEMINATION OF ERS-1 ALTIMETER DATA c82
A. Haskell *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 99-102 (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

Non-science aspects of ERS-1 (ESA) radar altimeter product definition are considered. User requirements, access to catalogs, and product range are discussed. Technical, scientific, and financial constraints are summarized. Quality assurance and standards are mentioned. Author (ESA)

N85-12436# Centre National d'Etudes Spatiales, Toulouse (France).
ERS-1 ALTIMETER GROUND SEGMENT RELATIONS TO OTHER SENSORS AND PROGRAMS
A. deLeffe *In* ESA ERS-1 Altimeter Radar Data Prod. Aug. 1984 p 103-109 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

It is argued that ERS-1 radar altimeter data cannot be considered and processed totally independently of the other satellite altimeters, nor of any other sensors measuring wind, waves or surface topography. Microwave sounder data must be merged systematically with altimeter data at an early stage of the processing. Calibration and data validation should be coordinated with other projects embarking altimeters for a better use of existing facilities and for intercalibration and data comparison. High level products must be standardized as far as possible. Precise dating of radar altimeter measurements (with an accuracy of 100 to 300 microsec) is mandatory. Otherwise possibilities of precise in-orbit altitude calibration and of precise orbit determination are wasted. Author (ESA)

N85-12437# Royal Netherlands Meteorological Inst., De Bilt.
IMPACT OF ERS-1 OBSERVATIONS ON WAVE FORECASTING IN THE NORTH SEA c48
E. Bouws, G. J. Komen, and G. J. L. Nooren (National Aerospace Laboratory, Amsterdam, Netherlands) *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 113-116 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

Wave forecasting in the North Sea with and without ERS-1 data is discussed. The measurement network in the North Sea is dense in the south, but very few measurements exist north of latitude 62. The numerical wave forecasting model uses atmospheric data from a numerical atmospheric model, because measurements in the north, which are very important for swell in the south, are not available. A typical case of model mis-prediction, where conclusions cannot be drawn through lack of data (either wind or wave) in the north is described. The ERS-1 data will be extremely useful here. In the southern part of the North Sea, ERS-1 will not add much data, especially if the influence of the coast is taken into account. Further to the north, the amount of ERS-1 data becomes comparable to the amount of surface data, albeit with a totally different spatial and temporal distribution. Author (ESA)

N85-12438# Norwegian Meteorological Inst., Blindern.
INTERCOMPARISON OF GEOS 3/SEASAT WAVE DATA AND WAVE MODEL DATA c48
A. Kjelaas (Stolt-Nielsen Seaway Submersibles A/S) and J. Guddal *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 117-120 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

The GEOS 3/SEASAT wave data and model data were compared as to their mutual consistency in different locations for significant wave height; their mutual agreement in spatial variations and synoptic appearance; and their way of showing a propagation story. Agreement is extremely good. Author (ESA)

N85-12439# Institute of Oceanographic Sciences, Wormley (England).
EXTRACTION OF WAVE PERIOD FROM ALTIMETER DATA **c48**
P. G. Challenor and M. A. Srokosz *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 121-124 refs Sponsored by ESA and UK Department of Industry (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

The method of extracting wave period information from radar altimeter data, based on altimeter skewness measurements and a relationship between skewness and significant slope is shown to be questionable, as no unique relationship appears to exist connecting skewness to significant slope for all sea states. An approach based on altimeter slope measurements and wave spectrum properties leads to the definition of a period parameter which may be related to zero-upcrossing and crest period parameters. Author (ESA)

N85-12440# Scott Polar Research Inst., Cambridge (England).
SEA ICE CHARACTERISTICS DERIVED FROM AIRBORNE ALTIMETRY
A. M. Cowan and V. A. Squire *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 125-127 ref (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

A microwave altimeter/scatterometer was flown over sea ice during the Marginal Ice Zone Experiment in the Bering Sea. Supporting data, especially from aerial photography, is used to provide a model input to a waveform simulation program designed for the ERS-1 altimeter and to interpret the altimeter data. Sea ice characteristics particular to the Bering Sea are described. Author (ESA)

N85-12441# Science Research Council, Chilton (England).
RADAR ALTIMETRY OVER SEA ICE
R. J. Powell, A. R. Birks, C. L. Wrench, W. J. Bradford, and B. F. Maddison *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 129-133 (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

Remote sensing of sea ice in the Marginal Ice Zone Experiment is described. A 13.7 GHz microwave radar altimeter/scatterometer, a 19 GHz electronically scanning microwave radiometer, scanning radiometers at 92 and 183 GHz, and an infrared, nadir pointing, temperature sounder were used; SLAR imagery and laser profilometry were collected in the same area from an aircraft and a large number of surface data were collected from ships. Data analysis using simple algorithms suggests that the relatively low bit rate data from satellite microwave altimeters and radiometers can be used together to provide better characterization of the marginal ice zone and its interaction with ocean waves on a global basis. Author (ESA)

N85-12442# Bergen Univ. (Norway). Dept. of Oceanography.
EDDY DETECTION IN THE NORWEGIAN, GREENLAND, AND BARENTS SEAS WITH A RADAR ALTIMETER
J. A. Johannessen *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 135-139 refs Sponsored by Royal Norwegian Council for Scientific and Industrial Research Original contains color illustrations (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

SEASAT altimeter data obtained in the Norwegian Sea were analyzed in order to study height variations associated with transient mesoscale features with a scale of 50 to 100 km. Significant height variations associated with two such features were found. Sufficient surface truth to verify these results does not exist. The possibility of detection of eddies along the ice edge in the marginal ice zone between Svalbard and Greenland is discussed. Results of dynamic height computations of a large topographic eddy in the Fram Strait suggest that it can be detected by satellite altimetry. Author (ESA)

N85-12443# Institute of Oceanographic Sciences, Wormley (England).
SEASAT ALTIMETER DATA OVER THE MEDITERRANEAN: IMPLICATIONS FOR ERS-1
T. H. Guymer and T. D. Allan *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 141-145 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

Techniques to minimize orbit and geoid errors when deriving sea surface slopes associated with ocean currents using satellite altimeter range data are described. One relies solely on using tracks from the period when SEASAT was in a 3-day repeat orbit and applies a tilt plus bias correction to remove the long wavelength effects of orbit uncertainty. The second references these data to an independently derived sea surface from an earlier part of the mission; NOAA IR imagery and SEASAT scatterometer data are used in the interpretation of features. The western Mediterranean is advocated for ERS-1 calibration zone, since the geoid is homogeneous, the skies are sufficiently clear for laser tracking, there are large areas of low mesoscale ocean variability, sea states are low, and tides are small and well known. Author (ESA)

N85-12444# Imperial Coll. of Science and Technology, London (England). Dept. of Physics.
SATELLITE ALTIMETRY FOR SEA-SURFACING TOPOGRAPHY DETERMINATION AND GEOID IMPROVEMENT
J. C. Marshall *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 147-151 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

The combined problem of determining the ocean circulation and improving the geoid from satellite altimetry was investigated in a simulation study of mesoscale variability. The use of a dynamical ocean model as a source of a-priori oceanographic information capable of discriminating between geoid errors and sea surface topography is described. Results show that better estimates of the sea surface topography and the geoid can be made by solving for them simultaneously rather than separately; even dynamical information is useful; and a dynamical ocean model can be used to discriminate between geoid errors and geostrophically balanced pressure gradients. Author (ESA)

N85-12445# Stuttgart Univ. (West Germany). Inst. for Navigation.
THE PRECISE RANGE AND RANGE RATE EQUIPMENT (PRARE) AND ITS POSSIBLE SUPPORT TO THE RADAR ALTIMETER MEASUREMENT FOR ERS-1 **c19**
P. Hartl *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 153-160 ref (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

The Precise Range and Range Rate Experiment (PRARE) which delivers slant range data with cm accuracy, is described, and its support for the ERS-1 radar altimeter (RA) is outlined. The PRARE can help to determine very precisely the orbit of ERS-1. It can measure the total electron content of the ionosphere, which is needed for the calculation of the ionospheric delay for the RA-signal. It can also support the along track scanning radiometer and the RA by collecting the meteorological data (pressure, temperature and moisture ground) which renders, with a proper model, the tropospheric delay of the tracking and RA signals. In all cases it is, however, necessary to consider more than the three ground stations foreseen. Author (ESA)

N85-12446# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
DETERMINATION OF THE ALTIMETRIC GEOID AND GRAVITY ANOMALIES IN THE NORTH SEA: IMPLICATIONS FOR A SOLUTION OF THE GENERAL CIRCULATION PROBLEM USING ERS-1 DATA
D. Leigemann *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 161-164 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

Results of the SEASAT Users Research Group of Europe validation project in the North Sea relevant to ERS-1 are discussed. For ERS-1, sampling of altimeter data (requiring a 35-day repetition rate orbit) over a period of 6 cycles (6 months) is suggested. Computation of mean sea surface heights, gravity anomalies and gravity disturbances at an equidistant grid for geophysical applications is proposed. Use of ship gravity observations over a test area defined by oceanographers to detect in the altimetric gravity signal the part due to sea surface topography is advocated. If this is successful, ship gravity measurements over the major ocean currents can be organized even after the ERS-1 mission, to solve the general circulation problem. Author (ESA)

N85-12447# University Coll., London (England). Mullard Space Science Lab.
SATELLITE ALTIMETRIC MEASUREMENTS OF LAKE LEVELS
I. M. Mason, C. G. Rapley, F. A. Street-Perrott (Oxford Univ.), and S. P. Harrison (Oxford Univ.) *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 165-169 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

The performance or radar altimetry over lakes is summarized. Results show that even with ocean-optimized altimeters such as those on SEASAT or ERS-1 it is possible to monitor lakes down to 70 sq km in area. There should be up to 1 lake per orbit measured, representing up to 200 lakes for a typical 14 day orbital repeat period (including 70% of lakes > 250 sq km in area). For calm, specularly reflecting lakes, there is a possibility of measuring several hundred more lakes down to 150 m in diameter. The need for the ERS-1 ground segment to be able to support this data product is noted. Author (ESA)

N85-12448# Scott Polar Research Inst., Cambridge (England).
SIMULATION OF WAVEFRONTS RETURNED BY REALISTIC SURFACES **c61**
E. Novotny, A. P. R. Cooper, and M. R. Gorman *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 171-170 (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

A computer program for waveform simulation which permits detailed analyses to be made of the returned signals from a large variety of simple and complex model surfaces representing open water, sea ice, and land ice, is introduced. These aid the study of real waveforms returned by a radar altimeter, in order to deduce the character of the terrain over which the altimeter flew. The program is written in ANSI standard FORTRAN 77. Author (ESA)

N85-12449# Scott Polar Research Inst., Cambridge (England).
ICE SHEETS AS INVARIANT SURFACES FOR RADAR ALTIMETER CALIBRATION AND ORBIT DETERMINATION
M. R. Gorman and D. J. Drewry *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 173-176 (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

Use of the Greenland and Antarctic continental ice sheets, and the large floating ice shelves surrounding the Antarctic continent to provide stable and smooth surfaces for calibration and validation of the ERS-1 radar altimeter, and short arc orbit determination is discussed. Error sources are considered, and an error budget is presented. It is concluded that ice sheets offer the potential for a more precise calibration, compared to a low latitude, sea level site. Author (ESA)

N85-12450# University Coll., London (England). Dept of Electronic and Electrical Engineering.
MODELLING OF ALTIMETER TRACKING OVER TOPOGRAPHICAL SURFACES
C. G. Rapley and H. D. Griffiths *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 177-180 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

Computer generated pulse streams representative of ice sheet returns were used to explore ways of improving altimeter performance. An analysis of ice sheet terrain in Antarctica suggests that with relatively simple modifications the SEASAT design could provide > 70% coverage of the Antarctic ice sheet north of 82 deg. Use of an ice mode on ERS-1 will permit even more complete coverage. Author (ESA)

N85-12451# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
ERS-1 RADAR ALTIMETER SYSTEM PERFORMANCE EVALUATION AND CALIBRATION **c32**
H. M. Braun, H. Groebke, and P. Hans *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 181-186 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

The ERS-1 (ESA) radar altimeter system simulation philosophy and simulator development are described. The simulator models system geometry, echo process, uplink/downlink, platform characteristics, instrument processing, ground processing, system errors, and special target characteristics (e.g., reflections from ice surfaces). It supports pre and post launch system-calibration; refinement of the engineering specifications during the ERS-1 development phase; monitoring and controlling of instrument design and development; prelaunch verification of system performance; investigation of inflight malfunctions and compensation of errors during nominal operations; development of echo models; and demonstration of system capabilities in operational cases.
Author (ESA)

N85-12452# Selenia S.p.A., Rome (Italy).
SIMULATION OF INFORMATION EXTRACTION FROM RADAR ALTIMETER RETURN ECHOES **c82**
G. Losquadro and R. Somma *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 187-192 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

The ERS-1 (ESA) radar altimeter performance over ice and ocean was simulated, and the effects of a mispointing tracking loop (MTL) were studied. Results validate the suboptimal maximum likelihood estimate (SMLE) tracking procedure. The resulting accuracies improve on the SEASAT radar altimeter. The introduction of the weighted center of gravity gives the ERS-1 altimeter great operational flexibility; this mode of operation could be used over ocean and over sea ice, which can also be tracked by SMLE. The MTL correction loop renders altimeter performance practically independent of the performances of the satellite attitude control. Author (ESA)

N85-12453# European Space Agency, Paris (France).
THE ALTIMETER AS A SUPPORT TO THE SCATTEROMETER IN THE REPRESENTATION OF WINDS AND DERIVED WAVE FIELDS IN COASTAL WATERS AND ENCLOSED SEAS: A RESEARCH AT ITS ONSET **c19**
R. Frassetto (EARSeL Working Group 2), T. Guymer (EARSeL Working Group 2), S. Zecchetto (EARSeL Working Group 2), C. Brossier (EARSeL Working Group 2), L. Ciraolo (EARSeL Working Group 2), and C. G. Rapley (EARSeL Working Group 2) *In its* ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 193-197 (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

Research on the symbiotic use of altimeter, scatterometer and radiometer in semienclosed seas and coastal waters is introduced. Analysis of SEASAT altimeter data near coastlines and of the coverage of SASS (SEASAT scatterometer) in the Mediterranean is presented. Author (ESA)

N85-12454# Centre National d'Etudes Spatiales, Toulouse (France).
THE POSEIDON ALTIMETER DESCRIPTION **c19**
P. Raizonville *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 199-204 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

An altimeter for an ocean circulation study is described. The

design is based on the SEASAT altimeter. Pulse length is 100 microsec, bandwith is 330 MHz, and compressed pulse length 3.03 nsec. Power amplification is performed by a solid state amplifier, output power is 2W. Author (ESA)

N85-12455# University Coll., London (England). Mullard Space Science Lab.
STANDARDIZATION OF DATA FORMATS FOR RADAR ALTIMETER DATA **c82**
R. F. Scott and H. E. Huckle *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 205-208 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

A standard tape format for satellite altimeter data, based on SEASAT and EXOSAT tapes is proposed. Allowances for data from future altimeters; data separation into technology dependent and independent components; incorporation of index pointers; and inclusion of filemarks are suggested. Author (ESA)

N85-12456# Centre National d'Etudes Spatiales, Toulouse (France). Groupe de Recherche de Geodesie Spatiale.
CALIBRATION AND VALIDATION AREAS **c19**
Y. Menard *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 209-213 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

Difficulties in calibrating the SEASAT altimeter using the Bermuda laser site are recalled, and the use of Dakar (Senegal) for altimeter calibration is discussed. The site is flat, has clear skies for 200 to 250 days per year, and a local tide model is available. Atmospheric parameters can be studied using existing facilities with two additional weather stations. Author (ESA)

N85-12457*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
LESSONS FROM THE SEASAT AND GEOS-3 ALTIMETERS DATA PROJECTS **c82**
M. E. Parke *In* ESA ERS-1 Radar Altimeter Data Products Aug. 1984 p 215-219 refs Sponsored by NASA (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

Project timeline and priorities, algorithm, and science aspects of the SEASAT mission relevant to ERS-1 (ESA) are discussed. The most important lessons for ERS-1 planning are the need to have data handling and reduction procedures ready ahead of time and the need for an intensive algorithm validation and engineering assessment period during the early part of the mission. Results from SEASAT indicate that ERS-1 will have the capability of producting useful scientific data if it can match or exceed the SEASAT accuracy level. Author (ESA)

N85-12458# Ohio State Univ., Columbus. Dept. of Geodetic Science and Surveying.
LOCAL GEOID DETERMINATION IN MOUNTAIN REGIONS
H. Moritz Dec. 1983 52 p
(Contract F19628-82-K-0017)
(AD-A145799; OSU/DGSS-352; AFGL-TR-84-0042) Avail: NTIS HC A04/MF A01 CSCL 08/5

The present report reviews and interrelates various methods for the local or regional determination of the geoid or of height anomalies according to Molodensky (i.e, of the quasi-geoid) from deflections of the vertical -- the astrogeodetic method -- or by a combination of vertical deflections with gravity anomalies by least-squares collocation. The classical astrogeodetic determination of the geoid by integration of vertical deflections reduced to sea level is compared with Molodensky's determination of height anomalies by integration of vertical deflections along the earth's surface. Extensive consideration is given to the reduction for curvature of the plumb line and to topographic-isostatic reduction of vertical deflections in the classical sense, which is a reduction to sea level, and in the modern sense, where the point remains on earth's surface. Then the application of collocation to the present problem is discussed. Finally, some results concerning geoid computations for Austria by collocation are outlined. GRA

N85-12459# Geological Survey, Tallahassee, Fla. Water Resources Div.
WATER RESOURCES DATA FOR FLORIDA, WATER YEAR 1983. VOLUME 3B: SOUTHWEST FLORIDA GROUND WATER Annual Water-Data Report, 1 Oct. 1981 - 30 Sep. 1982
R. T. Mycyk, L. D. Fayard, W. L. Fletcher, and J. K. Ogle Dec. 1983 480 p refs
(PB84-220862; USGS-WDR-FL-82-3B-Vol-3B; USGS/WRD/HD-84/012-Vol-3B) Avail: NTIS HC A21/MF A01 CSCL 08H

Water resources data for the 1982 water year for southwest Florida include continuous or daily discharge for 72 streams, periodic discharge for 28 streams, miscellaneous discharge for 19 streams, peak discharge for 10 streams, continuous or daily stage for 15 streams and periodic stage for 7 streams; continuous elevations for 42 lakes and periodic elevations for 68 lakes; continuous ground-water levels for 229 wells, periodic ground-water levels for 238 wells, and miscellaneous water-level measurements for 1,211 wells; and quality of water for 132 surface-water sites and for 228 wells. Author (GRA)

N85-12460# National Academy of Sciences - National Research Council, Washington, D. C.
WATER SCIENCE AND TECHNOLOGY BOARD Final Annual Report, 1983
Apr. 1984 46 p Sponsored in part by Bureau of Reclamation
(Contracts DI-14-08-0001-A-0121; DE-FG01-83ER-60161; Grant NSF CEE-83-07900)
(PB84-216571) Avail: NTIS HC A03/MF A01 CSCL 08H

The Water Science and Technology Board was established in 1982 to serve as the focal point for National Research council activities related to water resources. The Board's objective is to improve the scientific and technological bases for reaching important scientific questions and issues. Its scope covers all of the traditional scientific and engineering aspects of water resources and the economic, institutional, legal, educational, and social aspects, as well. Standing subcommittees of the Board conduct program level activities in four areas: water resources facilities and structures; water science; water quality and technology; and management, analysis, and planning. GRA

N85-12461# Geological Survey, Sacramento, Calif. Water Resources Div.
WATER RESOURCES DATA FOR CALIFORNIA, WATER YEAR 1982. VOLUME 1: SOUTHERN GREAT BASIN FROM MEXICAN BORDER TO MONO LAKE BASIN AND PACIFIC SLOPE BASINS FROM TIJUANA RIVER TO SANTA MARIA RIVER Annual Water-Data Report, 1 Oct. 1981 - 30 Sep. 1982
J. C. Bowers, M. T. Butcher, C. E. Lamb, J. A. Singer, and G. B. Smith [1982] 379 p refs Prepared in cooperation with California State Department of Water Resources
(PB84-220870; USGS-WDR-CA-82-1-Vol-1; USGS/WRD/HD-84/017-Vol-1) Avail: NTIS HC A17/MF A01 CSCL 08H

Water-resources data for the 1982 water year for California consists of records of stage, discharge, and water quality of streams; stage and contents of lakes and reservoirs; and water levels and water quality in wells. Discharge records for 160 gaging stations; stage and contents for 19 lakes and reservoirs; water quality for 20 streams and 20 wells; water levels for 174 observation wells are given. Also included are 10 crest-stage partial-record stations. Author (GRA)

N85-12462# Geological Survey, Tallahassee, Fla. Water Resources Div.
WATER RESOURCES DATA FOR FLORIDA, WATER YEAR 1982. VOLUME 3A: SOUTHWEST FLORIDA SURFACE WATER Annual Water-Data Report, 1 Oct. 1981 - 30 Sep. 1982
R. T. Mycyk, L. D. Fayard, W. L. Fletcher, and J. K. Ogle [1982] 627 p refs

(PB84-223080; USGS-WDR-FL-82-3A-Vol-3A; USGS/WRD/HD-84/011-Vol-3A) Avail: NTIS HC A99/MF A01 CSCL 08H

Water resources data for the 1982 water year for southwest Florida include continuous or daily discharge for 72 streams, periodic discharge for 28 streams, miscellaneous discharge for 19 streams, peak discharge for 10 streams, continuous or daily stage for 15 streams and periodic stage for 7 streams; continuous elevations for 42 lakes and periodic elevations for 68 lakes; continuous ground-water levels for 229 wells, periodic ground-water levels for 238 wells, and miscellaneous water-level measurements for 1,211 wells; quality of water for 132 surface-water sites and for 228 wells. Author (GRA)

N85-12463# Geological Survey, Lincoln, Nebr.
WATER RESOURCES DATA FOR NEBRASKA, WATER YEAR 1982 Annual Water-Data Report, 1 Oct. 1981 - 30 Sep. 1982
G. B. Engel, R. A. Engberg, and M. S. Johnson [1982] 380 p refs Prepared in cooperation with Nebraska Univ.
(PB84-223668; USGS-WDR-NE-82-1; USGS/WRD/HD-84/014) Avail: NTIS HC A17/MF A01 CSCL 08H

Water resources data for the 1982 water year for Nebraska consist of both surface water and ground water. Water-discharge records for 157 streamflow gaging stations, 27 partial-record or miscellaneous streamflow stations, and 5 crest-stage, partial-record streamflow stations; stage and content records for 10 lakes and reservoirs; water-quality records for 47 streamflow stations, 29 ungaged streamsites, and 57 wells; and water-level records for 59 observation wells are given. Additional water-discharge data were collected at various sites, not part of the systematic data-collection program, to determine surface-water/ground-water relationships. Author (GRA)

N85-12464# Geological Survey, Sacramento, Calif. Water Resources Div.
WATER RESOURCES DATA FOR CALIFORNIA, WATER YEAR 1982. VOLUME 3: SOUTHERN CENTRAL VALLEY BASINS AND GREAT BASINS FROM WALKER RIVER TO TRUCKEE RIVER Annual Water-Data Report, 1 Oct. 1981 - 30 Sep. 1982
R. P. Fogelman, T. C. Hunter, J. R. Mullen, and R. G. Simpson [1982] 395 p refs Prepared in cooperation with California Department of Water Resources
(PB84-223726; USGS-WDR-CA-82-3-Vol-3; USGS/WRD/HD-84/018-Vol-3) Avail: NTIS HC A17/MF A01 CSCL 08H

Water resources data for the 1982 water year for California consists of records of stage, discharge, gage-height, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels of wells. Discharge records for 157 gaging stations; stage and contents for 39 lakes and reservoirs; gage height records for two lakes; water quality of 11 stations; and water levels for 54 observation wells are given. Also included are 11 crest-stage partial-record stations and one water-quality partial-record station. Author (GRA)

N85-12199# Joint Publications Research Service, Arlington, Va.
SATELLITE, AIRBORNE REMOTE SENSING DEVELOPMENT OUTLINED
Bogdan Ney *In its* East Europe Rept.: Sci. Affairs, No. 791 (JPRS-84624) 26 Oct. 1983 p 118-127 Transl. into ENGLISH from Nauka Polska (Warsaw), no. 1-2, Jan. - Feb. 1983 p 87-95 (For primary document see N85-12195 03-31)
Avail: NTIS HC A07/MF A01

N85-12405 Ceskoslovenska Akademie Ved, Prague. Geophysical Inst.
HEAT FLOW MAP OF EUROPE: BRIEF SUMMARY OF THE GEOPHYSICAL IMPLICATIONS
Vladimir Cermak *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 295-314 refs (For primary document see N85-12389 03-42)
(Rept-562) Avail: Issuing Activity

N85-12406 Ceskoslovenska Akademie Ved, Prague. Geophysical Inst.
TERRESTRIAL HEAT FLOW IN EUROPE AND GENERAL FEATURES OF ITS REGIONAL DISTRIBUTION
Vladimir Cermak *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 315-324 refs (For primary document see N85-12389 03-42)
(Rept-563) Avail: Issuing Activity

N85-12408 Ceskoslovenska Akademie Ved, Prague. Inst. of the Physics of the Atmosphere.
ALGEBRA OF HYDRODYNAMIC FLOWS OF AN IDEAL FLUID AND THE PREDICTION OF THE BEHAVIOUR OF A SYSTEM OF PARTICLES OF A PASSIVE ADMIXTURE ON RIEMANN SURFACES WITH A VARIABLE CURVATURE
Jiri Horak *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 347-377 refs (For primary document see N85-12389 03-42)
(Rept-565) Avail: Issuing Activity

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N85-12465*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
NASA REDOX STORAGE SYSTEM DEVELOPMENT PROJECT Final Report
Norman H. Hagedorn Oct. 1984 48 p refs
(Contract DE-AI04-80AL-12726)
(NASA-TM-83677; E-2125; NAS 1.15:83677) Avail: NTIS HC A03/MF A01 CSCL 10C

The Redox Storage System Technology Project was jointly supported by the U.S. Department of Energy and NASA. The objectives of the project were to develop the Redox flow battery concept and to probe its technical and economic viability. The iron and chromium redox couples were selected as the reactants. Membranes and electrodes were developed for the original mode of operating at 25 C with the reactants separated by an ion-exchange membrane. Analytical capabilities and system-level operating concepts were developed and verified in a 1-kW, 13-kWh preprototype system. A subsequent change was made in operating mode, going to 65 C and using mixed reactants. New membranes and a new electrode catalyst were developed, resulting in single cell operation as high as 80 mA/sq cm with energy efficiencies greater than 80 percent. Studies indicate a likely system cost of about $75/kWh. Standard Oil of Ohio (Sohio) has undertaken further development of the Redox system. An exclusive patent license was obtained from NASA by Sohio. Transfer of Redox technology to Sohio is supported by the NASA Technology Utilization Office. Author

N85-12466# Arizona State Univ., Tempe. Dept. of Mechanical and Aerospace Engineering.
MATERIAL PROBLEMS FOR HIGH-TEMPERATURE, HIGH-POWER SPACE ENERGY-CONVERSION SYSTEMS Annual Progress Report
M. L. Ramalingam, D. L. Jacobson, J. F. Morris, and S. Snir May 1984 124 p
(Grant AF-AFOSR-0067-83)
(AD-A145940; CR-R-84032; AFOSR-84-0800TR-No-1) Avail: NTIS HC A06/MF A01 CSCL 11/6

High-temperature, high-power space energy-conversion sys-

tems follow an evolutionary path through continually expanding materials frontiers. Exponential growth trends point to requirements for ultimate alloys comprising the most refractory metals and metallide additives. Therefore understanding properties, transport tendencies and interaction characteristics of these ultralloy components is a crucial essentiality. Studies of such thermophysicochemical phenomena and their detailed parametric dependencies and influences for refractory materials receive intensive and extensive support in the USSR and other iron-curtain countries. But all potential users also recognize the generic ductility, embrittlement enigmas of the highest-temperature alloys and the related implications of recrystallization. This latter category is the research area of concentration for these studies. GRA

N85-12467# Lincoln Lab., Mass. Inst. of Tech., Lexington.
THE LIMP FLYWHEEL
R. M. Lerner 13 Jun. 1984 48 p
(Contract F19628-80-C-0002)
(AD-A146034; TR-684; ESD-TR-84-012) Avail: NTIS HC A03/MF A01 CSCL 13/9

It is proposed to design and construct energy storage flywheel rotors as statically limp tubes containing liquid mass, and to drive and support this rotating system (at least in part) directly, rather than through separately engineered subsystems. If the liquid is presumed thixotropic or viscous, nominally stiff structures subject to plastic flow are included. At one extreme of the design range, nearly all the mass is in the liquid and the only significant stresses are those in the wall of the containment; at the other extreme, the statically limp structure is nearly dry and is formed into an oblate surface by the centrifugal force of its own mass. GRA

N85-12468# Pacific Northwest Lab., Richland, Wash.
DYNAMIC AND OTHER SECONDARY BENEFITS OF COMPRESSED AIR ENERGY STORAGE
Robert D. Allen and Terrence J. Doherty May 1984 6 p refs Presented at the Intern. Symp. and Workshop on Dyn. Duties of Energy Storage Plants, Boston, 7-11 May 1984
(Contract DE-AC06-76RL-01830)
(DE84-015571; PNL-SA-12023; CONF-840515-2) Avail: NTIS HC A02/MF A01

Dynamic benefits of compressed air energy storage include load following, voltage regulation, provision for emergency power, and spinning reserve. Other secondary benefits inlcude environmental acceptability and economic feasibility within the spectrum of potential energy storage methods. Geologic reservoir candidates are salt cavities, hard rock caverns and water-bearing permeable formations occurring as structural traps; the compatibility of solution-mined salt cavities with desired dynamic benefits is illustrated by positive results at Huntorf, West Germany. Air injection into and withdrawal from an aquifer was conducted successfully at Pittsfield, Illinois. Environmental impacts are believed to be less important than corresponding impacts in rival storage technologies. DOE

N85-12469# NUKEM G.m.b.H., Hanau (West Germany). Zentralabteilung fuer Forschung und Entwicklung.
DEVELOPMENT OF THE PRODUCTION TECHNOLOGY OF Cu2S/CdS SOLAR GENERATORS Final Report, Dec. 1982
Bernd Schurich Bonn Bundesministerium fuer Forschung und Technologie Jul. 1984 56 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-84-137; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 12

The feasibility of industrial scale production of large area Cu2S/CdS solar cells and modules was determined. About 600 large area semiconductor layers were fabricated and transformed into cell units. An absolute layer thickness variation of 0.1 microns is obtained for a pallet of 50 by 50 sq cm. The variation of CdS layer thickness referred to pallet area amounts to 1 to 1.3 microns. The efficiency of the solar cells is between 3.5% and 5%. Author (ESA)

N85-12470# Gesamthochschule, Kassel (West Germany). Fachgebiet Energie-Elektronik.
OPERATIONAL BEHAVIOR OF WIND ENERGY CONVERTERS. CONTROL AND DYNAMIC AND TYPES OF GENERATORS, VOLUME 1 Final Report, Dec. 1982
Guenther Cramer, Peter Drews, Manfred Grawunder, Siegfried Heier, Werner Kleinkauf, Juergen Thuer, Reiner Wettlaufer, Peter Albrecht (Technische Universitaet, Brunswick), Werner Leonhard (Technische Universitaet, Brunswick), Werner Vollstedt (Technische Universitaet, Brunswick) et al Bonn Bundesministerium fuer Forschung und Technologie Jul. 1984 321 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie 2 Vol.
(BMFT-FB-T-84-154-Vol-1; ISSN-0340-7608) Avail: NTIS HC A14/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 71

Dynamic behavior of isolated wind power stations and converters connected to a large grid was studied. The possibilities of feeding power from a variable speed generator to a fixed frequency grid were investigated. Measurements on laboratory equipment and existing installations show that double-fed induction generators with cycloconverters in the rotor circuit permit fast decoupled control of active and reactive power. Author (ESA)

N85-12471# Gesamthochschule, Kassel (West Germany). Fachgebiet Energie-Elektronik.
OPERATIONAL BEHAVIOR OF WIND ENERGY CONVERTERS: CONTROL AND DYNAMIC AND TYPES OF GENERATORS, VOLUME 2 Final Report, Dec. 1982
Guenther Cramer, Peter Drews, Manfred Grawunder, Siegfried Heier, Werner Kleinkauf, Juergen Thuer, Reiner Wettlaufer, Peter Albrecht (Technische Universitaet, Brunswick), Werner Leonhard (Technische Universitaet, Brunswick), Werner Vollstedt (Technische Universitaet, Brunswick) et al Bonn Bundesministerium fuer Forschung und Technologie Jul. 1984 225 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie 2 Vol.
(BMFT-FB-T-84-154-Vol-2; ISSN-0340-7608) Avail: NTIS HC A10/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 71

Dynamic behavior of isolated wind power stations and converters connected to a large grid was studied. Induction generators with slip-power recovery and synchronous generators with DC-link were investigated. Measurements on laboratory equipment and existing installations show the feasibility of fast active power control at reduced hardware cost. Author (ESA)

N85-12472# Bremen Univ., (West Germany). Fachbereich Physik.
INVESTIGATIONS ON THE DYNAMIC LOADING OF WIND ENERGY CONVERTERS WITH VERTICAL AXIS AND PROBLEMS OF CONTROL DURING STARTING AND OVERLOAD CONDITIONS Final Report, Mar. 1983
Stephan Duetting, Lothar Helms, Hans-Joachim Strackerjan, Karl-Heinz Volk, and Krishna Simhan Bonn Bundesministerium fuer Forschung und Technologie Jul. 1984 94 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-84-155; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 20

A Darrieus windmill rotor with straight fixed blade geometry is presented. Blade profile and converter geometry were investigated to improve starting properties. A brake system based on an air spoiler stream emerging from the support arms for rotor control at high speeds was developed. Performance calculations show that a selfstarting wind converter is feasible. The brake system allows control of a grid geared Darrieus converter under overload conditions almost solely through the generator. A wind tunnel

developed for wind converter experiments is described.
Author (ESA)

N85-12473# Oesterreichisches Forschungszentrum Seibersdorf G.m.b.H., Vienna. Inst. fuer Reaktorsicherheit.
OPERATING EXPERIENCE WITH POTASSIUM SYSTEMS
Norbert Schwarz Apr. 1984 11 p refs Presented at 3rd BNES Conf. on Liquid Metals Eng. and Technol. in Energy Production, Oxford, Apr. 1984
(OEFZS-4275; RS-237/84) Avail: NTIS HC A02/MF A01

Use of potassium topping cycles to increase the conversion efficiency of thermal power stations is discussed. Feasibility studies show that such a process is economically possible with existing materials and today's technology. Material behavior and component reliability aspects of boilers, vapor lines and turbines, condensers, and boiler feed lines are discussed. Potassium and cover gas analysis, and safety factors are considered. Author (ESA)

N85-12474# Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.
OCEAN ENERGY SYSTEMS AT THE JOHNS HOPKINS UNIVERSITY APPLIED PHYSICS LABORATORY Quarterly Report, Jul. - Dec. 1983
Dec. 1983 32 p
(PB84-225705; JHU/APL/OQR-83/3; APL/OQR-83/4) Avail: NTIS HC A03/MF A01 CSCL 10A

The Johns Hopkins University Applied Physics Laboratory, is engaged in developing Ocean Thermal Energy Conversion systems that will provide synthetic fuels (e.g., methanol) or an energy-intensive product such as ammonia (for fertilizers and chemicals) or aluminum. The work also includes assessment and design concepts for hybrid plants, such as geothermal-OTEC plants. The Laboratory also has a technical advisory role with respect to DOE/DOET's management of the preliminary design activity of an industry team headed by Ocean Thermal Corporation that is designing an OTEC pilot plant that could be built in shallow water off the shore of Oahu, Hawaii. In addition, the Laboratory is now taking part in a program to evaluate and test the Pneumatic Wave-Energy conversion System, an ocean-energy device consisting of a turbine that is air-driven as a result of wave action in a chamber. Work on the various tasks as of 31 December 1983 is summarized. GRA

N85-12475 Maryland Univ., College Park.
CONTROL AND PERFORMANCE OF A PHOTOVOLTAIC-THERMAL ENERGY SYSTEM Ph.D. Thesis
Eric O. Bazques 1983 204 p
Avail: Univ. Microfilms Order No. DA8419465

The control of a photovoltaic/thermal energy (PV/T) system in general and optimization of performance in particular through use of modern (state space) control methods, stochastic weather inputs, and second law of thermodynamics analysis is addressed. Significant improvement in system performance is noted using optimal control when compared to conventional on/off, multilevel, or proportional controllers for deterministic weather forcing functions. Optimal system control, analyzed first through use of Pontryagin's Minimum Principle and then implemented by specification of a quadratic performance index and solution of matrix Riccati equations, is shown to be a viable and useful strategy for these hybrid systems. Stochastic weather techniques which incorporate temperature/insolation probability density matrices and least square constants are found to be a valid method for reducing simulation requirements as long as weather persistence effects are taken into account through use of information derived from Markov transition matrices. Dissert. Abstr.

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N85-12476 Cornell Univ., Ithaca, N.Y.
AIRPORT NOISE IMPACT PREDICTION AND MEASUREMENT Ph.D. Thesis
Albert T. Stoddard, III 1984 244 p
Avail: Univ. Microfilms Order No. DA8415413

The prediction of noise impact based on activity interference is discussed. Nonresidential impact is quantified in terms of the time lost because of the noise intrusion. Residential interference is estimated using a probabilistic model because of the large random element in individual response to aircraft noise. The residential model is developed from the concept of household loss of utility due to increased noise. The methodology developed for estimating airport noise impact is unique in several ways. It incorporates several models for different activities. Nonresidential noise impact is quantified for the first time. Separate models are used for different times of the day, allowing for different numbers of people in residence and for changing sensitivity as home activities change throughout the day. The impact which is predicted based on ctivity interference has an economic meaning and may be used in economic analyses of noise mitigation measures which are proposed for alleviating an airport noise problem.
Dissert. Abstr.

N85-12477# Defence Research Information Centre, Orpington (England).
ANALYSIS OF RADIOCOBALT IN ENVIRONMENTAL SAMPLES
S. Bando Oct. 1984 36 p refs Transl. into ENGLISH from Radioisotopes (Japan), no. 2, 1983 p 297-306
(DRIC-T-7334) Avail: NTIS HC A03/MF A01

Radioactivity measurements of environmental samples in Japan have progressed on the basis of radioactivity investigations accompanying radioactive fallout as a result of nuclear explosion tests, with nuclide analyses of Sr(90) Cs (137), etc. In recent years, however, radiactivity investigations of environmental samples intended to gain an awareness of accumulation trends and behavior in the radionuclide environment as well as the full-scale behavior of atomic energy installation were also elaborately performed.
Author

N85-12478*# National Aeronautics and Space Administration, Washington, D. C.
STUDY OF ANNOYANCE DUE TO URBAN AUTOMOBILE TRAFFIC. ANNEX 4: A CATALOG OF THE CHARACTERISTICS OF NOISE AT DIFFERENT MEASURING POINTS
D. Aubree, S. Auzou, and J. M. Rapin Jul. 1984 17 p Transl. into ENGLISH from "Etude de la gene due au trafic automobile urbain. Annex 4: Catalogue des characteristiques du bruit aux diverses points de mesure" Paris, June 1971 p 214-221, 232-233 and 409-414 Transl. by Kanner (Leo) Associates), Redwood City, Calif. Original doc. prep. by Centre Scientifique et Technique du Batiment, Paris
(Contract NASw-3541)
(NASA-TM-77516; NAS 1.15:77516) Avail: NTIS HC A02/MF A01 CSCL 13B

The characteristics of urban traffic were studied. Data synthesis of and data specifically for the city of Paris concerning noise due to automobile traffic were examined. Information on noise characteristics at different measuring locations is presented. E.A.K.

N85-12479*# National Aeronautics and Space Administration, Washington, D. C.
PATTERNS OF BEHAVIOR IN LODGINGS EXPOSED TO TRAFFIC NOISE
Jacques Lambert, Francois Simonnet, and Michel Vallet Nov. 1984 136 p refs Transl. into ENGLISH of "Comportements dans l'habitat soumis au bruit de circulation" rept. IRT-47, Sep. 1980 145 p Transl. by Scientific Translation Service, Santa Barbara, Calif. Original doc. prep. by Inst. de Recherche des Transports, Arcueil, France
(Contract NASw-3542)
(NASA-TM-77750; NAS 1.15:77750; IRT-47) Avail: NTIS

HC A07/MF A01 CSCL 13B

Threshold values for public services interferent on the attenuation to noise nuisance were defined. Daily life at home was described and collected on the use of residences, the effects of noise on health and sleep, and the incidence of running away from home. A correlation was made with the equipment and noise insulation of homes. It is shown that there are behavior patterns in the modification of considerable manner in the way of life for people who live in apartments and in individual houses, above 66 dB during daytime. E.A.K.

N85-12480*# Hamilton Standard, Windsor Locks, Conn.
DEVELOPMENT OF A PREPROTOTYPE TIMES WASTEWATER RECOVERY SUBSYSTEM Final Report
George J. Roebelen, Jr. and Gerard F. Dehner Feb. 1982 195 p
(Contract NAS9-15471)
(NASA-CR-171815; NAS 1.26:171815; SVHSER-7236) Avail: NTIS HC A09/MF A01 CSCL 13B

A three-man wastewater recovery preprototype subsystem using a hollow fiber membrane evaporator with a thermoelectric heat pump to provide efficient potable water recovery from wastewater on extended duration space flights was designed, fabricated, and tested at one-gravity. Low power, compactness and gravity insensitive operation are featured in this vacuum distillation subsystem. The tubular hollow fiber elements provide positive liquid/gas phase control with no moving parts, and provide structural integrity, improving on previous flat sheet membrane designs. A thermoelectric heat pump provides latent energy recovery. Application and integration of these key elements solved problems inherent in all previous reclamation subsystem designs. Author

N85-12481*# Hamilton Standard, Windsor Locks, Conn.
ADDENDUM: DEVELOPMENT OF A PREPROTOTYPE TIMES WASTEWATER RECOVERY SUBSYSTEM Final Report
Gerard F. Dehner Feb. 1982 112 p
(Contract NAS9-15471)
(NASA-CR-171816; NAS 1.26:171816; SVHSER-7236-Add) Avail: NTIS HC A06/MF A01 CSCL 13B

The results of the second generation operational improvements and the TIMES (Thermoelectric Integrated Membrane Evaporation Subsystem) 2 study are covered. Areas covered in the second generation operational improvements are improved temperature control, water quality improvements, subsytem operational improvements, solid handling improvements, wastewater pretreatment optimization, and membrane rejuvenation concepts. The task for the TIMES 2 study are thermoelectric regenerator improvement, recycle loop pH operational criteria, recycle loop component optimization, and hollow fiber membrane evaporator improvement. Results are presented and conclusions are drawn from both studies. E.R.

N85-12482*# Hamilton Standard, Windsor Locks, Conn.
DEVELOPMENT OF A PREPROTOTYPE TIMES WASTEWATER RECOVERY SUBSYSTEM: APPENDICES Final Report
George J. Roebelen, Jr. and Gerard F. Dehner Feb. 1982 208 p
(Contract NAS9-15471)
(NASA-CR-171817; NAS 1.26:171817; SVHSER-7236-App) Avail: NTIS HC A10/MF A01 CSCL 13B

This Master Test Plan outlines the test program to be performed by Hamilton Standard during the Urine Water Recovery Subsystem Program. Testing is divided into three phases: (1) design support testing; development component testing; and acceptance testing. The completion of this test program verifies the subsystem operation. Author

N85-12483# California Univ., Livermore. Lawrence Livermore Lab.
A PROPOSED REFERENCE SET OF SCENARIOS FOR RADIATIVELY ACTIVE ATMOSPHERIC CONSTITUENTS
D. J. Wuebbles, M. C. MacCracken, and F. M. Luther Oct. 1984 54 p refs
(Contract W-7405-eng-48)
(DOE/NBB-0066; TR015) Avail: NTIS HC A04/MF A01

A set of scenarios for past and future concentrations of radiatively active atmospheric constituents was developed. Suggested time dependent scenarios for historical and future surface concentrations of the examined radiatively active atmospheric constitutents are summarized. R.S.F.

N85-12484# North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
ORGANIC AEROSOL FORMATION: OH(HYDROXYL RADICAL) VERSUS OZONE OXIDATION PATHWAYS Final Report
D. L. Fox, M. Gery, and H. E. Jeffries Mar. 1984 219 p refs
(PB84-219880; CRC-APRAC-CAPA-8-71) Avail: NTIS HC A10/MF A01 CSCL 07D

Results of an investigation of oxidation pathways leading to organic aerosol formation from selected precursor compounds are reported. The compounds 1-hexene, 1,7-octadiene cyclopentene, cyclohexene, toluene, meta-xylene, and 1,3,5-trimethylbenzene were investigated. Experimental and a combination of ozone and hydroxyl radical attack on a single organic aerosol precursor compound. The ozone oxidation pathway experiments yielded information about the amounts of aerosol formed from alkenes and aromatics and kinetic information on four alkene compounds. For the four alkene compounds, with the exception of 1-hexene, the presence of ozone is important in forming hydrocarbon oxidation products with sufficiently low vapor pressures to form organic aerosols. GRA

N85-12485# Environmental Protection Agency, Research Triangle Park, N.C. Office of Air Quality Planning and Standards.
REVIEW OF THE NAAQS (NATIONAL AMBIENT AIR QUALITY STANDARDS) FOR CARBON MONOXIDE: REASSESSMENT OF SCIENTIFIC AND TECHNICAL INFORMATION Final Report
Jul. 1984 57 p refs
(PB84-231315; EPA-450/5-84-004) Avail: NTIS HC A04/MF A01 CSCL 13B

The available scientific and technical information that EPA staff believes is most relevant to the review of the primary (health) national ambient air quality standards for carbon monoxide is evaluated. Staff recommendations on alternative approaches to revising the standards are given. The assessment is intended to bride the gap between the scientific review in the EPA criteria document and criteria document addendum for carbon monoxide and the judgments required of the Administrator in setting ambient air quality standards for carbon monoxide. The major recommendations of the staff paper include the following: that the 8 hour primary standard level be set in the range 9 to 12 parts per million; and that the 1-hour primary standard level be set in the range 25 to 35 parts per million to provide a comparable level of protection. GRA

N85-12486# Meteorology Research, Inc., Altadena, Calif.
ANALYSIS OF SANTA BARBARA OXIDANT STUDY Final Report
T. B. Smith, W. D. Saunders, and F. H. Shair (California Inst. of Tech.) Dec. 1983 248 p refs Sponsored by State of California
(PB84-229277; MRI-FR-1900A; ARB-R-84/225) Avail: NTIS HC A11/MF A01 CSCL 13B

An observational study was conducted in the Santa Barbara/Ventura Area in September 1980 to develop a data base for use in modeling the air quality environment in the area. The program consisted of ozone measurements, pibal observations and aircraft aerometric measurements. Tracer releases were made from a number of offshore areas. The data set to determine the potential influence of offshore drilling on air quality levels in the area is analyzed. Tracer trajectories were frequently subjected to wind shifts and light wind conditions which lead to increased dilution. Tracer arriving at the end of the seabreeze flow ended and was not carried into the inland valleys. GRA

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N85-12487 Oregon State Univ., Corvallis.
PETROLOGY AND GENESIS OF CARBONATE-HOSTED Pb-Zn-Ag, SAN CRISTOBAL DISTRICT, DEPARTMENT OF JUNIN, PERU Ph.D. Thesis
Mark William Bartlett 1984 301 p
Avail: Univ. Microfilms Order No. DA8418148

The San Cristobal District is located in the Cordillera Occidental 110 km east of Lima, Peru. The deposits consist of polymetallic vein and stratiform replacement (manto) ores situated in rocks of Devonian through Early Jurassic age. Vein-type ores are localized by steeply-dipping normal faults which end transverse to an asymmetrical anticline, whereas manto deposits are found only in limestones of the Triassic-Jurassic Pucara Group at, or near, intersections with large veins. A hydrothermal convention cell was initiated by intrusion of an intermediated to silicic quartz porphyry stock and dike system between 5 and 7 m.y. ago. Hydrothermal alteration produced a pervasive quartz-sericite mineral assemblage in the intrusive and adjacent country rocks. Vein mineralization took place in three distinct episodes, each separated by intervals of brecciation, and produced mineral assemblages consisting of: (1) pyrite-wolframite-quartz, (2) chalcopyrite-sphalerite-galena-sulfosalts, and (3) manganosiderite-barite-marcasite. Dissert. Abstr.

N85-12488 California Univ., Santa Barbara.
STRATIGRAPHY, PETROLOGY, AND TECTONIC SETTING OF THE ALISITOS GROUP, BAJA CALIFORNIA, MEXICO Ph.D. Thesis
John McIntyre Beggs 1983 236 p
Avail: Univ. Microfilms Order No. DA8411228

The Alisitos Group comprises much of the wall-rocks of the western Peninsular Ranges Batholith in Baja California, Mexico; aspects of its stratigraphy, petrology, and tectonic origin are discussed. The Alisitos group was formerly designated Alisitos Formation. A higher rank of stratigraphic nomenclature is suggested because of its wide extent and lithologic diversity. Two new formations are defined within the Alisitos Group in the San Fernando area. The El Progreso Formation includes volcanic and volcaniclastic rocks mainly of silicic composition interstratified with rudist limestones. The type area is the El Progreso area. It is overlain to the southwest by the San Felipito Formation, which includes tuff-breccia, graded tuff beds, and shale as principal rock types. The main canyon of Arroyo San Fernando is designated as type area. Dissert. Abstr.

N85-12489 Idaho Univ., Moscow.
GEOLOGY OF SELECTED MIGMATITE ZONES WITHIN THE BITTERROOT LOBE OF THE IDAHO BATHOLITH, IDAHO AND MONTANA Ph.D. Thesis
Enid Bittner-Gaber 1983 187 p
Avail: Univ. Microfilms Order No. DA8418372

The Bitterroot lobe of the Idaho batholith is a complex area of migmatite zones, batholith plutons, cross cutting mafic dikes and Tertiary plutons. Selected migmatite zones were studied on the western and southern borders of the lobe as well as within the central and eastern areas. The prebatholith units within the migmatize zones consists of tonalite gneiss, quartzite, calcsilicate, schist, quartzofeldspathic gneiss and amphibolite. The units shows a petrologic and chemical affinity to the existing Belt Supergroup and prebatholith country rocks. The migmatite zones are a result of the intrusion, metasomatism and partial assimilation of the country rock by tonalite, granodiorite and granite of the batholith. The migmatite zones reflect five deformational events. The migmatite units have retained their original east-west flow alignment thus forming good strain indicators. Dissert. Abstr.

N85-12490 Washington Univ., Seattle.
GLACIER DYNAMICS AND THE DEVELOPMENT OF GLACIAL LANDFORMS IN THE EASTERN PUGET LOWLAND, WASHINGTON Ph.D. Thesis
Derek Blake Booth 1984 251 p
Avail: Univ. Microfilms Order No. DA8419116

Reconstructions of the extend, altitude, and mass balance of the Puget lobe lead to an estimate of its sliding velocity and basal water flux. Lobe dimensions are inferred from ice limits and flow direction indicators. An equilibrium line altitude of 1220 m is calculated for the maximum of the Vashon advance. Resultant average sliding velocities range up to 600 m/a and average meltwater discharges up to 2500 cu m/s. Deeply incised valleys in the eastern lowland reflect considerable erosion primarily by subglacial meltwater. The analysis of subglacial water flow is expanded to include the effects of sliding ice, providing a physical model for the development of subglacial fluvial landforms. Analysis of the physical behavior of ice and water privides geologic insights regarding the location and internal composition of embankments. Basal stress conditions control both depositional processes and physical properties of subglacial sediments. Pore pressures are responsible for low till strength and consequent deformation of subglacial sediments by moving ice. Dissert. Abstr.

N85-12491 Princeton Univ., N. J.
SEDIMENTARY AND TECTONIC EVOLUTION OF THE WESTERN TAIWAN FOREDEEP Ph.D. Thesis
Michael Conrad Covey 1984 298 p
Avail: Univ. Microfilms Order No. DA8417412

Lithofacies analysis of Plio-Pleistocene foredeep deposits located continentward of the active Taiwan orogen show that depositional environments ranged from deep marine to fluvial. Deep marine sediments consist of mud and silt deposited from suspension. Shallow marine deposits are heterogeneous, and indicate that bioturbation, tidal, and storm processes were active during deposition. Deltaic deposits are also varied, due to the diverse marine and fluvial processes that were active on the deltas. Fluvial deposits are of two types: sandstone-dominated and cobble-dominated, both deposited by braided rivers. The spatial and temporal distribution of depositional environments within the basin show that the foredeep evolved through several stages. Comparison of the western Taiwan foredeep with other foredeeps indicates that the steady-state configuration is determined by physical energy of the depositional environments, geology of the source area, geometry of plate collision, and, possibly, and glacio-eustatic sea-level changes. Dissert. Abstr.

N85-12492 Texas A&M Univ., College Station.
DEFORMATION MECHANISMS ASSOCIATED WITH MESOSCOPIC KINKBANDS, JURA MOUNTAINS (SWITZERLAND) AND CHAINES SUBALPINES (FRANCE) Ph.D. Thesis
Renee Heilbronner Panozzo 1984 348 p
Avail: Univ. Microfilms Order No. DA8417770

Eighteen mesoscopic kinkbands have been studied in the Jura Mountains and the Chaines Subalpines (Switzerland and France). The geometry of the kinkbands was determind by stereophotogrammetric analysis (3-d digitization and computer evaluation); the state of deformation in and next to the kinkbands by detail study of microscopic and mesoscopic deformation mechanisms. On the basis of the observed state of deformation, two types of kinkbands were distinguished, for which two different kinematic models were inferred. Analysis of the gross geometry of the kinkbands shows that the orientation of the kinkband boundaries with respect to bedding, alpha 1 ranges between 30 deg and 80 deg; the angle between the kinkband boundaries and the rotated layers, alpha 2, ranges between 30 deg and 110 deg and 110 deg. Stereophotogrammetric results of 18 kinkbands are presented, and one outcrop of each type of kinkband is discussed in detail. Dissert. Abstr.

N85-12493 Cornell Univ., New York, N.Y.
GEOLOGY AND GEOCHEMISTRY OF EARLY TERTIARY SUBMARINE VOLCANIC ROCKS OF THE ALEUTIAN ISLANDS,

AND THEIR BEARING ON THE DEVELOPMENT OF THE ALEUTIAN ISLAND ARC Ph.D. Thesis
James L. Rubenstone 1984 367 p
Avail: Univ. Microfilms Order No. DA8415426

Field mapping, petrologic study, and geochemical analysis of early Tertiary submarine volcanic rocks from the central and western Aleutian islands gives insight into the early growth of the Aleutian Island Arc, and into its later thermal history as recorded in the low and very low grade metamorphism of these units. Major contrasts between sequences on Adak Island (central Aleutians) and Attu Island (western Aleutians) reflect fundamental differences in their tectonic environments of formation. The Adak sequence (Finger Bay volcanics; FBV) is dominently mafic to intermediate pyroclastic rocks. An Ar-40/Ar-39 rage spectrum of a plagioclase separate from the FBV indicates a metamorphic event 34 m.y. ago (due to hydrothermal circulation during cooling of a pluton on southern Adak), and crystallization age in excess of 50 m.y. The Attu sequence of basaltic (and some spilitic) pillow lava and lesser volcanic breccia is cut by a dike complex of similar composition, overlain by Oligocene bedded sedimentary rocks (including laminated chert). Dissert. Abstr.

N85-12494 Washington Univ., Seattle.
STRATIGRAPHY, SEDIMENTOLOGY AND TECTONIC SIGNIFICANCE OF THE UPPER CRETACEOUS VIRGINIAN RIDGE FORMATION, METHOD BASIN, WASHINGTON: IMPLICATIONS FOR TECTONIC HISTORY OF THE NORTH CASCADES Ph.D. Thesis
James Hugh Trexler, Jr. 1984 234 p
Avail: Univ. Microfilms Order No. DA8419197

Sediments in the basin beyond the delta platform comprise sandy and conglomeratic turbidities and submarine debris flow deposits. Calculations based on characteristics of these debris flows give a basin paleoslope estimate of less than two degrees. Internal stratigraphy of the Virginian Ridge Formation demonstrates a progression upward and westward from a quite, marine facies through delta platform and inner-delta facies to subaerial fluvial and alluvial fan facies. The later Cretaceous Methow Basin is interpreted as a wrench fault basin generated in response to transpressive dextral offset and uplift of a highland to the west. Stratigraphy and sedimentology of the Albian-campanian Methow sequence indicates that: (1) the basin was asymmetric normal to its axis; (2) the basin was asymmetric along its axis; (3) the relatively short and steep fan delta system deposited along the western margin was laterally amalgamated and possibly time-transgressive to the north. Dissert. Abstr.

N85-12495 Cornell Univ., New York, N.Y.
FRANCISCAN AND RELATED ROCKS OF SOUTHERN HUMBOLT COUNTY, NORTHERN CALIFORNIA COAST RANGES: ANALYSIS OF STRUCTURE, TECTONICS, SEDIMENTARY PETROLOGY, PALEOGEOGRAPHY, DEPOSITIONAL HISTROY, AND THERMAL MATURITY Ph.D. Thesis
Michael Bruce Underwood 1984 376 p
Avail: Univ. Microfilms Order No. DA8415421

The following rock units were examined: (1) the Franciscan Central Belt, a Cretaceous polymict melange terrane; (2) the Yager complex, a mildly-deformed sequence of Paleogene deep-marine deposits; (3) the Coastal Belt Franciscan, a lower-to-mid Tertiary sequence dominated by stratally-disrupted turbidities; and (4) the Wildcat Group, a Neogene unit of shelf and upper-slope sediments. Field investigations concentrated on basic structural data and description of contact relationships. Yager strata are clearly thrust beneath the Central Belt melange, with a minimum of seventeen kilometers of horizontal displacement. Interestingly, vitrinite reflectance data show that several kilometers of tectonic overburden are associated with this so-called Garberville thrust. Wildcat deposits are in both depositional and high-angle fault contact with underlying Yager and Franciscan strata. Because of their intense degree of stratal disruption, Central Belt and Coastal Belt rocks probably represent the accreted portions of a late Mesozoic to Tertiary subduction complex. Petrographic examination of sandstones from these four rock units demonstrate the complexity of Codilleran paleogeography and sediment dispersal. Dissert. Abstr.

N85-12496 Wisconsin Univ., Madison.
GEOPHYSICAL INVESTIGATIONS OF THE CENTRAL PART OF NIGER STATE, NIGERIA Ph.D. Thesis
Joshua O. Adeniyi 1984 181 p
Avail: Univ. Microfilms Order No. DA8413235

The structural and tectonic nature of the Nupe basin and the adjacent basement complex was studied. Gravity and magnetic surveys were made in the central part of Niger State, Nigeria. The interpretation given here is of a rift origin for the Nupe basin. The initiation of rifting started in the adjacent Benue trough in the early Cretaceous, this gave rise to other rifted troughs in the Cretaceous period. The gravity measurements suggest the existence of up warping of the Moho in the Nupe basin. A mantle rise of the order of 5 km was calculated. Models were fit to the residual Bouguer anomalies. The greatest sandstone thickness obtained from the models is about 3.5 km. The modeled lower crust rises to the surface between Minna and Paiko, and also near Kataeregi. The structural trend of this rise coincides with the trend of the quartz mica schist belt in the northeastern section of the surveyed area. Magnetic models lead to an estimated thickness of overburden in the basement complex area of about 10.4 km. An aeromagnetic map of a portion of the region indicates that magnetic minerals of economic importance are unlikely to be present in this area. Dissert. Abstr.

N85-12497 Wisconsin Univ., Madison.
POST-SONOMAN CONODONT BIOFACIES OF THE TRIASSIC OF NORTHWESTERN NEVADA Ph.D. Thesis
Stephen Paul Carey 1984 335 p
Avail: Univ. Microfilms Order No. DA8414223

Biofacies interpretation of Star Peak and partly equivalent basinal conodonts is based upon sedimentologically and paleontologically determined lithofacies relationships as well as a regional shelf oceanic basin terranes model. Late Spathian transgression initiated Star Peak sedimentation. Deep shelf (basinal) conditions represented by the lower member of the Prida Formation supported an abundant neospathodid fauna (Neospathodus homeri and N. triangularis) succeeded by a neogondolellid fauna (Neogondolella jubata and N. timorensis). At the same time, restricted shallow marine waters to the east were sparsely populated by neogondolellids. During the Anisian, deep shelf (basinal) conditions characterized all of Star Peak deposition (Fossil Hill Member). Ladinian progradation of a carbonate platform across the shelf resulted in a diversification of environments. None was hospitable to conodonts. The platform slope lithology (upper Prida) is apparently barren. Rare neogondellids occur in restricted shallow marine deposits of the Home Station Member (Augusta Mountain Formation) but are absent from the supratidal Panther Canyon Member. Dissert. Abstr.

N85-12498 Idaho Univ., Moscow.
GEOGRAPHIC AND STRATIGRAPHIC DISTRIBUTION OF MIOCENE PALYNOMORPHS IN NORTH IDAHO Ph.D. Thesis
Robert B. Jorstad 1983 201 p
Avail: Univ. Microfilms Order No. DA8418377

Acetolysis of Early and Middle Miocene sediments from the Clarkia, Idaho, area yielded 3,477 palynomorphs representing 37 taxa from eighteen samples for assemblage analysis. Relative pollen frequency data from various study sites suggest an older Coniferae-Mixed Dicotyledoneae-Pteridophyte Palynomorph Assemblage Zone, and a younger Fagaceae-TCT-Platanus Pollen Assemblage Zone. Two pollen based chronostratigraphic stages are proposed for at least part of the Miocene epoch: an older Clarkian Stage, and a younger Oviattian Stage. Palynomorph stratigraphic range charts document the youngest regional occurrence of Lygodium. Two palynomorph taxa are possible index fossils in the Pacific Northwest: (1) Sigmopollis (Incertae Sedis) for the Oligocene, and (2) Elaeagnus (Elaeagnaceae) for the Late Oligocene-Early Miocene. Palynostratigraphic and assemblage analyses of the fossil bearing sediments confirms prior models for

the infilling of Miocene Clarkia Lake, and a regional change from a warm temperature to temperate climate. Dissert. Abstr.

N85-12499 Montana Univ., Missoula.
LATE QUARTERLY GLACIOLACUSTRINE AND VEGETATIONAL HISTORY OF THE COPPER RIVER BASIN, SOUTH-CENTRAL ALASKA Ph.D. Thesis
Cathy Lynn Conner 1984 135 p
Avail: Univ. Microfilms Order No. DA8417867

The complex glacial history of the Copper River basin, represented by fluvial, glaciolacustrine, and full glacial sediments, includes multiple occupations by a proglacial lake as ice repeatedly advanced into the basin from surrounding source areas and dammed drainage outlets. A mid-Wisconsin intrastadial is suggested by glacial ice ablation, lowered lake levels, and the widespread deposition of fluvial sediments in the basin. This period is estimated to have occurred between 65,000 and 30,000 years ago based on radiocarbon dates and an amino racemization age of wood, and represents a time of climatic amelioration in the Copper River basin. Late Wisconsin glaciolacustrine deposits at Trapper's Den, Gakona, and Willow Creek contained spruce, birch, and alder pollen. These units suggested that small stands of forest persisted into the late Wisconsin glacial advance beginning about 30, 000 years ago. Pollen spectra derived from peat units at Blue Lake, Ahtell Creek, and the Little Nelchina River, contained rate spruce and alder. Birch, juniper, and sedge were the dominant pollen types in these units. These post-glacial pollen assemblages indicate the recolonization of the newly emerged basin surface by pioneer herb and shrub species. Spruce forests were reestablished in the Copper River basin by 9,400 years ago. Eolian silts capping river bluff sections at Gakona, the Kotsina delta, and Chitina, contained abundant spruce, poplar, birch, alder, and willow pollen. Dissert. Abstr.

N85-12500 Drexel Univ., Philadelphia, Pa.
MEASUREMENTS OF ATMOSPHERIC CARBON DISULFIDE USING AIRCRAFT PLATFORMS AND A GC/MS ISOTOPIC DILUTION ANALYSIS TECHNIQUE Ph.D. Thesis
Brian Joseph Tucker 1984 89 p
Avail: Univ. Microfilms Order No. DA8417653

Free tropospheric CS2 was sampled on packed traps over a 92 deg latitude range using the NASA Electra aircraft was analyzed by an optimized gas chromatograph mass spectrometer (GC/MS). The mean and standard deviation of 43 CS2 data were 5.5 + or - 1.9 pptv. A lower limit of detection of 0.04 pmoles or CS2 was achieved. A plotting routine was created to calculate the loss rate of CS2, DMS, H2S and OCS from their reactions with hydroxyl radical and the loss rate of CS2 due to photooxidation from ground level to the top of the troposphere. The S atoms produced by reaction of each gas were assumed to eventually form SO2. Carbon disulfide had the largest loss rate in the boundary layer by more than a factor of two over H2S and more than a factor of five over DMS. In the free troposphere, photooxidation of CS2 was the predominant loss mechanism. The loss of SO2 by reaction with OH was calculated to find the percent contribution of each reduced sulfur gas to atmospheric SO2. Carbon disulfide made the largest contribution in both the boundary layer and free troposphere. However, only 38% of the SO2 in the boundary layer and 30% of SO2 in the free troposphere could be accounted for by losses of reduced sulfur gases. Dissert. Abstr.

N85-12501# Commonwealth Scientific and Industrial Research Organization, Aspendale (Australia).
REPORT OF THE DIVISION OF ATMOSPHERIC PHYSICS, 1980-1983
1984 65 p
Avail: NTIS HC A04/MF A01

The objectives of the dynamics research program are: (1) the increase of understanding of the dynamics and physics of the atmosphere and, to a lesser extent, the ocean; and (2) the use of this knowledge to develop procedures and models to improve short and long-term weather forecasting and prediction of other socially and economically significant environmental variables, such as the concentration of atmospheric pollutants and the large scale atmospheric transport of chemical constitutents. Descriptions are divided, rather arbitrarily, into three areas - large scale dynamics which embodies geostrophic flow, smale scale dynamics which involves sub-geostrophic flow, and geophysical fluid dynamics involving primarily laboratory-tank experiments. B.G.

N85-12502# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A SYSTEM FOR MONITORING RADON AND ITS DECAY PRODUCTS IN THE ATMOSPHERE [UM SISTEMA PARA MONITORACAO DO RADONIO E SEUS PRODUTOS DE DECAIMENTO NA ATMOSFERA]
E. B. Pereira, D. J. R. Nordemann, A. M. Takashima, L. S. V. Dutra, and S. L. Mantelli Neto Apr. 1984 22 p refs In PORTUGUESE; ENGLISH summary Submitted for publication Sponsored in part by Fundo Nacional de Desenvolvimento Cientifico e Tecnologico
(INPE-3085-PRE/494) Avail: NTIS HC A02/MF A01

A device to simultaneously measure the radon content of the atmosphere and its decay products associated with the atmospheric aerosols is described. The random daughters isotopes are precipitated through an eletrostatic field onto an alpha particles detector which is also the collecting electrode. Either total counting or spectral analysis can be obtained as output date. The decay products of radon associated to the aerosols are measured in membrane filters after collecting the atmospheric aerosols within a given sampling time interval. Some preliminary performance results are reported. Author

N85-12503# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
CONTRIBUTION TO THE RADIOGEOLOGY OF SAO ROQUE, SP, GRANITES
E. B. Pereira and K. Fujimori Apr. 1984 21 p refs Submitted for publication
(INPE-3079-PRE/492) Avail: NTIS HC A02/MF A01

Gamma-ray spectrometric measurements were performed on 33 hand samples of the Pirituba granite, Sao Roque group, Brazil. The average abundances of potassium, uranium, and thorium are 3.7%, 5.6 ppm, and 12 ppm respectively. The granite presents lower thorium concentration than the global average abundance in granites of the crust. The radiogenic heat production calculated from radioelement concentration is 2.6 micro W/cu m. Field gamma ray spectrometric profiles were also performed with results compatible with the laboratory analyses. Author

N85-12504*# California Inst. of Tech., Pasadena. Seismological Lab.
DYNAMIC COMPRESSION AND VOLATILE RELEASE OF CARBONATES
James A. Tyburczy and Thomas J. Ahrens 13 Nov. 1984 50 p refs
(Grant NGL-05-002-105)
(NASA-CR-174076; NAS 1.26:174076) Avail: NTIS HC A03/MF A01 CSCL 08G

Particle velocity profiles upon shock compression and isentropic releases were measured for polycrystalline calcite. The Solenhofen limestone release paths lie, close to the Hugoniot. Calcite 3 to 2 transition, upon release, was observed, but rarefaction shocks were not detected. The equation of state is used to predict the fraction of material devolatilized upon isentropic release as a function of shock pressure. The effect of ambient partial pressure of CO2 on the calculations is demonstrated and considered in models of atmospheric evolution by impact induced mineral devolatilization. The radiative characteristics of shocked calcite indicate that localization of thermal energy occurs under shock compression. Shock entropy calculations result in a minimum estimate of 90% devolatilization upon complete release from 10 GPa. Isentropic release paths from calculated continuum Hugoniot temperatures cross into the CaO (solid) + CO2 (vapor) field at improbably low pressures. It is found that release paths from measured shock temperatures cross into the melt plus vapor field

at pressures greater than .5 GPa, which suggests that devolatilization is initiated at the shear banding sites. E.A.K.

N85-12505# Southwest Research Inst., San Antonio, Tex.
MAGNETOSPHERIC PLASMA STUDIES USING DATA FROM THE DYNAMICS HIGH AND LOW ALTITUDE PLASMA INSTRUMENTS
J. N. Barfield 15 May 1984 62 p
(Contract F19628-82-K-0024)
(AD-A145751; SWRI-15-7053-2; AFGL-TR-84-0136; SR-2) Avail: NTIS HC A04/MF A01 CSCL 04/1

Plasma measurements made on Dynamics Explorer 1 and 2 spacecraft are providing new information on the altitude dependence of polar-cap plasma populations, their sources, and the acceleration processes they undergo. This study found that the polar-rain electron population apparently exhibits no significant altitude dependence between altitudes of a few hundred to approximately 20,000 km. This result was expected from the magnetosheath-like energy spectrum of the low-altitude polar rain. In this case of the polar wind, a significant velocity increase was theoretically predicted to occur between the two spacecraft altitudes, and this effect was confirmed by DE-1 plasma measurements. A major result of this study of the accelerated polar wind is its significant conic component, which indicates that the ions are heated perpendicularly as they emerge from the polar-cap ionosphere. The gradual decrease in polar-wind energy observed to occur from the cusp across to the nightside polar cap suggests that the perpendicular heating process, probably in cyclotron waves, is most intense near the cusp region. Significant altitude effects are also observed in the plasmas that occupy magnetic flux tubes connected to polar-cap auroral arcs (or theta auroras). At DE-2, typical low-energy (approximately 100 eV) inverted-V electron distributtions are observed. At DE-1 the electron and positive-ion distribution functions are consistent with electrostatic potential drops that are at times below the typical DE-1 altitude of 15,000 to 20,000 km and at times above these altitudes. GRA

N85-12506# SRI International Corp., Menlo Park, Calif.
IRREGULARITY DECAY IN AN ISOLATED PLASMA BUBBLE Report, 1 Oct. 1983 - 31 May 1984
R. C. Livingston and J. F. Vickrey 31 May 1984 26 p
(Contract F19628-84-K-0019)
(AD-A145782; AFGL-TR-84-0146; SR-1) Avail: NTIS HC A03/MF A01 CSCL 04/1

Complex signal scintillation observations of an isolated and decaying equatorial plasma bubble are described. Multiple scans through the bubble made from the Air Force Geophysics Laboratory Airborne Ionospheric Observatory, show evolution of irregularity energy over a broad range of scale sizes. At wavelengths larger than about 4 km, the energy remains nearly constant with time. At shorter scale sizes, the spectrum maintains an approximate law form (f-n) and n increases with time. This behavior suggests that the effective cross-field diffusion rate in the F region depends on scale size. Such a dependence has recently been predicted theoretically and is the result of magnetic field line coupling to the E layer. GRA

N85-12507# Air Force Geophysics Lab., Hanscom AFB, Mass.
INFERENCE OF EQUATORIAL FIELD-LINE INTEGRATED ELECTRON DENSITY VALUES USING WHISTLERS
D. Anderson, P. M. Kinter, and M. C. Kelley 1 Aug. 1984 18 p
(AF Proj. 2310)
(AD-A145822; AFGL-TR-84-0195) Avail: NTIS HC A02/MF A01 CSCL 04/1

The nighttime electron density integrated along a magnetic field line at very small L-values is inferred by comparing whistler dispersions measured from a sounding rocket with model ionospheric calculations. At a local time of 0500 LT, the electron density of the F-layer valley was found to be about 1000/cc. We suggest that this technique can be applied to earlier times in the local evening to determine ionospheric conditions which benefit the growth of low latitude plasma instabilities. Author (GRA)

N85-12508# California Inst. of Tech., Pasadena.
FINITE-DIFFERENCE SYNTHETIC SEISMOGRAMS FOR SH WAVES Technical Report, 12 Jan. 1983 - 11 Jan. 1984
J. Vidale, D. Helmberger, and R. Clayton 13 Aug. 1984 82 p
(Contract F19628-83-K-0010)
(AD-A145834; AFGL-TR-84-0082; SR-1) Avail: NTIS HC A05/MF A01 CSCL 08/11

The research performed under this contract, during the period 12 January 1983 through 11 January 1984, can be divided into two major topics: finite-difference synthetic seismograms for SH waves; and array analysis of the ground motions from the 1971 San Fernando Earthquake. In Section 2, the accuracy and ease of application of the finite-difference method for generating synthetic seismograms of SH wave propagation in cylindrically symmetric media is discussed. The finite-difference method was the advantage that arbitrary density and velocity field in the medium may be specified. A point source is generated by a simple transformation of a line source. The accuracy of the finite-difference seismograms in flat layered media is confirmed by comparison with the Cagniard De-Hoop method. The finite-difference seismograms also agree with a previously untried dipping-layer Cagniard method. An earthquake radiation pattern is approximated by introducing a near-field which has permanent displacement near the source. GRA

N85-12509# National Telecommunications and Information Administration, Boulder, Colo.
GLOBAL MAPS OF foF2 DERIVED FROM OBSERVATIONS AND THEORETICAL VALUES
D. N. Anderson, C. M. Rush, M. Pokempner, J. Perry, and F. G. Stewart 31 Jul. 1984 144 p
(AF Proj. 2310)
(AD-A145866; NTIA-84-140; AFGL-TR-84-0194) Avail: NTIS HC A07/MF A01 CSCL 04/1

Observations of the F2-region critical frequency, foF2, and values determined from the time-dependent continuity equation for ions and electrons in the ionosphere have been used to develop a new set of numerical coefficients to represent the global variation of foF2. The coefficients developed in this study, like those in earlier investigations, permit monthly median hourly values of foF2 to be obtained at any location around the globe for any month of the year and solar activity level. The procedures undertaken to develop the new numerical coefficients are described in this report. Comparisons between foF2 determined using older sets of numerical coefficients and foF2 determined using the new set of coefficients are given along with a description of how well each set of coefficients specifies and predicts the observed variations in the F2-region critical frequency. GRA

N85-12510# Massachusetts Inst. of Tech., Cambridge.
ASYMPTOTIC ORBIT THEORY FOR TRAPPED ELECTRONS IN INHOMOGENEOUS WHISTLER FIELD Interim Report
G. Hilfer and K. Molvig Jan. 1984 29 p
(Contract N00014-83-K-0319; RR0-1109)
(AD-A146178; PFC/IR-84-1) Avail: NTIS HC A03/MF A01 CSCL 04/1

The particle trapping phenomenon that occurs in the Whistler emission process is more complex than the trapping by an infinite wave in a homogeneous system. Because of the inhomogeneous background magnetic field and the antiparallel electron and wave velocities, electrons experience trapping for only a finite length of their orbits. Successive trapping and detrapping events occur, even for an infinite wave train. A self-consistent theory for the emission process requires knowledge of the orbits throughout these different phases. One must follow the electrons for many trapping periods and accurately track the phase so that the detrapping point can be computed. The present report describes an asymptotic theory that allows this to be done, basically by finding an adiabatic invariant of the trapped electron motion. GRA

N85-12511# Aerospace Corp., Los Angeles, Calif.
A 2-DIMENSIONAL DESCRIPTION OF POTENTIAL PERTURBATIONS TO THE OZONE LAYER DUE TO NOx AND H-2-O

AIRCRAFT EMISSIONS
G. F. Widhopf, L. Glatt, and E. Ruth Jan. 1984 118 p
(Contract DOT-FA77WAI-720)
(AD-A146292; FAA/EE-84-11) Avail: NTIS HC A06/MF A01 CSCL 04/1

This report is divided into two parts. Part 1 is an interim report, which describes the basic two-dimensional photochemical model of the atmosphere developed to model the distribution of trace species in the natural atmosphere, as well as potential perturbations arising from NOx and H2O emissions from a fleet of supersonic and subsonic aircraft projected to be operational in the 1990-2000 year timeframe. A listing of the model transport parameters is included. Part II includes an update for the natural and perturbed atmosphere using rates recommended by the panel in 1982. Distributions of trace species calculated for a natural atmosphere are in relatively good agreement with observations. The potential effect of NO emissions from the fleet of subsonic and supersonic aircraft examined in this study is to slightly increase the ozone column. GRA

N85-12512# Rome Air Development Center, Griffiss AFB, N.Y.
MILLIMETER-WAVE PROPAGATION AND REMOTE SENSING OF THE ATMOSPHERE
E. E. Altshuler Dec. 1983 70 p
(AF Proj. 4600)
(AD-A146339; RADC-TR-83-297) Avail: NTIS HC A04/MF A01 CSCL 04/1

The propagation characteristics in the millimeter-wave region of the spectrum are of particular interest because the waves have a strong interaction with lower atmospheric gases and particulates. The effects of this interaction are twofold: on the other hand, atmospheric absorption, scattering and refraction limit the performance of millimeter-wave systems; on the other hand, this interaction allows the propagated wave to be used as a diagnostic tool to probe lower atmospheric structure. The principal applications of millimeter waves have been in the areas of communications, radar, and remote sensing. The availability of large bandwidths makes this region of the spectrum particularly attractive for high data rate communications. Because the angular resolution of an aperture is inversely proportional to wavelength, higher resolution antennas are achievable at millimeter waves than at longer wavelengths. GRA

N85-12513*# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetio.
COLD STREAMS OF IONOSPHERIC OXYGEN IN THE PLASMA SHEET DURING THE CDAW-6 EVENT OF MARCH 22, 1979
S. Orsini, E. Amata, M. Candidi, H. Balsiger (Bern Univ.), M. Stokholm (Bern Univ.), C. Huang (Iowa Univ., Iowa City), W. Lennartsson (Lockeed Palo Alto Research Lab., Calif.), and P.-A. Lindqvist (Royal Inst. of Tech., Stockholm) Dec. 1983 30 p refs Submitted for publication Sponsored by Swiss National Foundation and ESA
(Contracts NAS5-26257; NAS5-25530; Grant NGL-16-001-002; Contract N00014-76-C-0016)
(NASA-CR-174064; NAS 1.26:174064; IFSI-83-16) Avail: NTIS HC A03/MF A01

During magnetospheric substorm events, the plasma and ion composition experiments in the ISEE-1 and 2 satellites detected cold ionospheric O+ streams, moving tailwards in the near Earth magnetotail. Flow is parallel to the magnetic field lines, with drift velocity in agreement with the electric field topology obtained by mapping the model ionospheric field along the magnetic field lines. Fluctuations of the flow velocity of the streams can be related to magnetotail movements. Oscillations of the flow direction and speed with periods ranging from 5 to 10 min that suggest the presence of waves are observed. The streams are observed at all distances between 15 and 6 Re from the Earth. When averaged over 360 deg, the streams show up as a low energy peak, superimposed on the distribution of isotropic plasma sheet ions. This double-peak structure of the energy spectrum seems typical of the disturbed plasma sheet. Author (ESA)

N85-12514# Danish Space Research Inst., Lyngby.
OCCURRENCES OF THE POLAR SLANT E CONDITION (SEC) AT NARSSARSSUAQ, GODHAVN, THULE 1982
I. S. Primdahl 1984 47 p refs
Avail: NTIS HC A03/MF A01

Monthly data sheets of quarter of half hourly polar slant E occurrences at Narssarssuaq, Godhavn and Thule in 1982 are given. Author (ESA)

N85-12515# Royal Inst. of Tech., Stockholm (Sweden). Dept of Plasma Physics.
A MODEL FOR THE PROPAGATION OF THE WESTWARD TRAVELING SURGE
P. L. Rothwell, M. B. Silevitch, and L. P. Block May 1984 29 p refs
(Contract F19628-83-K-0014)
(TRITA-EPP-84-03) Avail: NTIS HC A03/MF A01

A unified model for the propagation of the Westward Traveling Surge (WTS) which explains the diversity in the observed surge characteristics was developed, using a model for the surge region which includes the Hall and Pedersen currents. Results show that WTS direction depends strongly on the degree of current closure on the poleward boundary. The sensitivity of the surge direction to closure depends on the ratio (R) of the Hall to the Pedersen conductivities. The magnitude of the surge velocity is sensitive to the energy spectrum of the precipitating electrons and weakly dependent on R. The ratio of the surge velocity to the measured drift velocity is independent of degree of closure at the surge head and the northern boundary. The expansion phase of the substorm is explained by assuming that the initial arc brightening arises from a sudden hardening of the precipitating electron energy spectrum at its poleward boundary. Author (ESA)

N85-12390 Ceskoslovenska Akademie Ved, Prague. Geophysical Inst.
EARTHQUAKE ACTIVITY IN THE BOHEMIAN MASSIF AND IN THE WESTERN CARPATHIANS
Vit Karnik, Zdenka Schenkova, and Vladimir Schenk *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 9-33 refs (For primary document see N85-12389 03-42)
(Rept-547) Avail: Issuing Activity

N85-12391 Karlova Univ., Prague (Czechoslovakia). Inst. of Geophysics.
SPECIFIC PHENOMENA ASSOCIATED WITH THE PROPAGATION OF SEISMIC WAVES IN CENTRAL EUROPE
Jaromir Jansky, Jaroslava Plomerova (Ceskoslovenske Akademie Ved, Prague), Libuse Ruprechtova (Ceskoslovenske Akademie Ved, Prague), and Vladislav Babuska (Ceskoslovenske Akademie Ved, Prague) *In* Ceskoslovenske Akademie Ved Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 35-50 refs (For primary document see N85-12389 03-42)
(Rept-548) Avail: Issuing Activity

N85-12392 Scientific Coal Research Inst., Ostrava (Czechoslovakia).
HOLE SHOTS ALONG REFRACTION PROFILE R4/78 RECORDED AT THE TEMPORARY SEISMIC STATION NEAR STARY PLZENEC (WEST BOHEMIA)
Karel Holub *In* Ceskoslovenske Akademie Ved Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 51-69 refs (For primary document see N85-12389 03-42)
(Rept-549) Avail: Issuing Activity

N85-12393 Ceskoslovenska Akademie Ved, Prague. Geophysical Inst.
IN SITU EXPERIMENT ON SHEAR WAVES GENERATION AND DETERMINATION OF ELASTIC PROPERTIES OF SOILS
Vladimir Schenk and Bohuslav Ruzek (Karlova Univ., Prague) *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 71-102 refs (For primary document see N85-12389 03-42)
(Rept-550) Avail: Issuing Activity

N85-12394 Karlova Univ., Prague (Czechoslovakia). Inst. of Geophysics.
SEISMOLOGY IN ROCKBURST RESEARCH
Jiri Buben, Vladimir Rudajev (Ceskoslovenske Akademie Ved, Prague), and Petr Fucik (Ceskoslovenske Akademie Ved, Prague) *In* Ceskoslovenske Akademie Ved Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 103-118 refs (For primary document see N85-12389 03-42)
(Rept-551) Avail: Issuing Activity

N85-12395 Ceskoslovenska Akademie Ved, Prague. Geophysical Inst.
STANDARDIZATION OF AMPLITUDE CHARACTERISTICS OF GALVANOMETRIC SEISMOGRAPHS IN THE KAPG NETWORK
Vladimir Tobyas *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 119-126 refs (For primary document see N85-12389 03-42)
(Rept-552) Avail: Issuing Activity

N85-12396 Ceskoslovenska Akademie Ved, Prague. Geophysical Inst.
SVKD AND SVKM-3 SEISMOGRAPHS WITH A LOW-SENSITIVITY CHANNEL
Vladimir Tobyas *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 127-142 refs (For primary document see N85-12389 03-42)
(Rept-553) Avail: Issuing Activity

N85-12397 Ceskoslovenska Akademie Ved, Prague. Geophysical Inst.
SHORT-PERIOD SEISMOGRAPH SVSN-6
Vladimir Tobyas *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 143-154 refs (For primary document see N85-12389 03-42)
(Rept-554) Avail: Issuing Activity

N85-12398 Ceskoslovenska Akademie Ved, Prague. Geophysical Inst.
CATALOGUE OF EARTHQUAKES FOR THE TERRITORY OF CZECHOSLOVAKIA FOR THE PERIOD 1957 - 1980
Vit Karnik, Dana Prochazkova, and Ivan Broucek (Slovak Academy of Sciences, Bratislava) *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 155-186 refs (For primary document see N85-12389 03-42)
(Rept-555) Avail: Issuing Activity

N85-12399 Ceskoslovenska Akademie Ved, Prague. Geophysical Inst.
STATISTICAL PROPERTIES OF GEOMAGNETIC PULSATIONS AT THE OBSERVATORY OF FUERSTENFELDBRUCK DETERMINED WITH THE AID OF PULSATION INDICES. PART 2: PERIODICITY IN THE OCCURRENCE OF PULSATIONS
Jaroslav Strestik *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 187-202 refs (For primary document see N85-12389 03-42)
(Rept-556) Avail: Issuing Activity

N85-12400 Ceskoslovenska Akademie Ved, Prague. Geophysical Inst.
MAGNETIC CHARACTERISTICS OF SOME VOLCANIC ROCKS OF THE WEST CARPATHIANS
Vladimir Kropacek and Tomas Zelinka *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 203-216 refs (For primary document see N85-12389 03-42)
(Rept-557) Avail: Issuing Activity

N85-12401 Ceskoslovenska Akademie Ved, Prague. Geophysical Inst.
ELECTRIC PROPERTIES OF NEOVOLCANIC ROCKS OF CENTRAL AND EAST SLOVAKIA
Marcela Lastovickova *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 217-233 refs (For primary document see N85-12389 03-42)
(Rept-558) Avail: Issuing Activity

N85-12402 Ceskoslovenska Akademie Ved, Prague. Geophysical Inst.
CHARACTERISTICS OF ABSORPTION AND FREQUENCY FILTRATION OF ULF ELECTROMAGNETIC WAVES IN THE IONOSPHERE
Karel Prikner *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 235-253 refs (For primary document see N85-12389 03-42)
Avail: Issuing Activity

N85-12403 Ceskoslovenska Akademie Ved, Prague. Geophysical Inst.
SEASONAL VARIATIONS OF REFLEXIBILITY AND TRANSMISSIBILITY OF ULF WAVES PROPAGATING THROUGH THE IONOSPHERE OF GEOMAGNETIC MID-LATITUDES
Karel Prikner *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 255-283 refs (For primary document see N85-12389 03-42)
(Rept-560) Avail: Issuing Activity

N85-12404 Ceskoslovenska Akademie Ved, Prague. Geophysical Inst.
RESPONSE OF THE F2 LAYER TO THE POLARITY OF THE INTERPLANETARY MAGNETIC FIELD
Ludmila Triskova *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 285-294 refs (For primary document see N85-12389 03-42)
(Rept-561) Avail: Issuing Activity

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N85-12516 Colorado State Univ., Fort Collins.
MESOSCALE AND CONVECTIVE-SCALE CHARACTERISTICS OF MATURE HURRICANES Ph.D. Thesis
David Paul Jorgensen 1984 209 p
Avail: Univ. Microfilms Order No. DA8417093

Analysis of instrumented aircraft data taken during radial penetrations of four recent intense hurricanes reveals common mesoscale and convective scale features of the inner core region. The structure and organization of the convection, wind, and vertical motion are studied by combining the data from the aircraft's state parameter instrumentation with quantitative radar measurements. The major new findings are: (1) the eyewall vertical motion was highly organized and was located several kilometers inward from the maximum winds and highest rainfall (2) the eyewall sloped outward substantially with height; (3) the range of vertical velocities and rainfall rates were much weaker than those typically found in continental thunderstorms; (4) storms with symmetric wind distributions were found to have circular and contractin eyewalls, and; (5) vertical motions in rainbands were not as highly organized as the eyewall. Implications of the observations to weather modification are also discussed. Dissert. Abstr.

N85-12517 Cornell Univ., Ithaca, N.Y.
A TEMPERATURE CLIMATOLOGY FOR NEW YORK STATE Ph.D. Thesis
Thomas William Schmidlin 1984 288 p
Avail: Univ. Microfilms Order No. DA8415395

Daily maximum and minimum temperatures are examined for the period 1951-80 at 80 weather stations. Results of statistical analyses are presented for weekly for weekly temperatures, heating degree days, growing degree days, freezing degree days, freeze hazard, and freeze-thaw cycles. Means of weekly temperatures are not normally (Gaussian) distributed, though only small errors will result from the assumption of normality. A normal frequency distribution fits annual heating degree day (base 65 F) accumulations. Regression equations are given for the relationship between growing degree days calculated by three methods; Base 50, 50-86, and Corn Heat Unit. The average and standard deviation of annual and seasonal growing degree days are given, along with accumula-

tions expected from various dates to the end of the growing season. Summary results for all parameters are presented in tables and maps. Information is provided on interpolation between stations and the effects of time of temperature observation. Appendices include descriptions of weather stations, station histories, and locations. Dissert. Abstr.

N85-12518 Colorado State Univ., Fort Collins.
A SPATIAL MODEL OF WIND SHEAR AND TURBULENCE FOR FLIGHT SIMULATION Ph.D. Thesis
C. warren Campbell 1984 133 p
Avail: Univ. Microfilms Order No. DA8417080

A three dimensional model which combines measurements of wind shear in the real atmosphere with three-dimensional Monte Carlo simulated turbulence was developed. The measurement of three-dimensional wind shear is a recent development. Measurements were made on a rather coarse (approximately 200 m) grid scale so that high frequency, short length scale turbulence information was not included. The spatial model adds three-dimensional, Monte Carlo simulated turbulence conforming to the von Karman model. The turbulence was generated in the frequency domain and transformed to the space domain using Fast Fourier Transform techniques. With the present model, the wind field over the body of an aircraft can be simulated and all aerodynamic loads and moments calculated. The inclusion of three-dimensional variation of winds and turbulence is believed to be a significant advance over previous wind simulation models. Dissert. Abstr.

N85-12519# Committee on Science and Technology (U. S. House).
CARBON DIOXIDE, THE GREENHOUSE EFFECT AND CLIMATE: A PRIMER
John Justus Washington GPO 1984 24 p refs Presented to the Subcomm. on Natural Resources, Agr. Res. and Environ. and the Subcomm. on Invest. and Oversight of the Comm. on Sci. and Technol., 98th Congr., 2d Sess., Oct. 1984 Prepared by the Library of Congr., Congr. Res. Serv.
(GPO-33-444) Avail: Subcommittee on Natural Resources, Agriculture Research and Environment

Issues of the greenhouse effect discussed, were: increase in atmospheric carbon dioxide concentration; sources and sinks for carbon dioxide; temperature effects; prediction of future atmospheric carbon dioxide levels; the detection problem: finding the signal in the noise; and the effects of increasing carbon dioxide on people and the environment. B.G.

N85-12520# Colorado State Univ., Fort Collins. Dept. of Atmospheric Sciences.
SUMMARY OF 1984 ATLANTIC SEASONAL TROPICAL CYCLONE ACTIVITY AND VERIFICATION OF AUTHOR'S FORECAST
William M. Gray 28 Nov. 1984 27 p refs Sponsored by NSF
Avail: NTIS HC A03/MF A01

Tropical cyclone activity which occurred in the Atlantic in 1984 and which verified the forecast of this activity was issued last May is summarized. This forecast was based on previous research which relates seasonal Atlantic hurricane activity to: (1) the El Nino (EN); (2) the quasi-biennial Oscillation (QBO) of equatorial 30 mb stratospheric wind; and (3) the April-May Caribbean Basin-Gulf of Mexico sea-level pressure anomaly (SLPA). It is indicated that the 1984 hurricane season should have been a slightly above average year with about seven hurricanes, 10 hurricanes and tropical storms, and 30 hurricane days. The actual number of hurricanes which occurred in 1984 was four; actual number of hurricanes and tropical cyclones was 11; and actual number of hurricane days was 18. The actual number of hurricane and tropical cyclone days was 56. The 1984 tropical cyclone season is summarized the prediction of parameters and their verification are discussed. Reasons for observed versus forecast differences are discussed. An outlook for Atlantic tropical cyclone activity in 1985 is also given. E.A.K.

N85-12521*# National Aeronautics and Space Administration, Washington, D. C.
WIND SHEAR MEASURING ON BOARD AN AIRLINER
P. Krauspe May 1984 24 p refs Transl. into ENGLISH of "Scherwindmssungen im Linienflugbetrieb" rept. DFVLR-MITT-80-09 DFVLR, presented at the 10th Symp. on Aircraft Integrated Data Systems, 1980 p 95-119 Symp. held in Aachen, 26-27 Mar. 1980 Original language document was announced as N81-20011 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3541)
(NASA-TM-77463; NAS 1.15:77463; DFVLR-MITT-80-09) Avail: NTIS HC A02/MF A01 CSCL 04B

A measurement technique which continuously determines the wind vector on board an airliner during takeoff and landing is introduced. Its implementation is intended to deliver sufficient statistical background concerning low frequency wind changes in the atmospheric boundary layer and extended knowledge about deterministic wind shear modeling. The wind measurement scheme is described and the adaptation of apparatus onboard an A300 airbus is shown. Preliminary measurements made during level flight demonstrate the validity of the method. Author (ESA)

N85-12522*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
GASP CLOUD- AND PARTICLE-ENCOUNTER STATISTICS AND THEIR APPLICATION TO LFC AIRCRAFT STUDIES. VOLUME 2: APPENDIXES
William H. Jasperson (Control Data Corp., Minneapolis), Gregory D. Nastron (Control Data Corp., Minneapolis), Richard E. Davis, and James D. Holdeman Oct. 1984 212 p
(NASA-TM-85835-Vol-2; L-15789-Vol-2; NAS 1.15:85835-Vol-2) Avail: NTIS HC A10/MF A01 CSCL 04B

Summary studies are presented for the entire cloud observation archive from the NASA Global Atmospheric Sampling Program (GASP). Studies are also presented for GASP particle-concentration data gathered concurrently with the cloud observations. Cloud encounters are shown on about 15 percent of the data samples overall, but the probability of cloud encounter is shown to vary significantly with altitude, latitude, and distance from the tropopause. Several meteorological circulation features are apparent in the latitudinal distribution of cloud cover, and the cloud-encounter statistics are shown to be consistent with the classical mid-latitude cyclone model. Observations of clouds spaced more closely than 90 minutes are shown to be statistically dependent. The statistics for cloud and particle encounter are utilized to estimate the frequency of cloud encounter on long-range airline routes, and to assess the probability and extent of laminaar flow loss due to cloud or particle encounter by aircraft utilizing laminar flow control (LFC). It is shown that the probability of extended cloud encounter is too low, of itself, to make LFC impractical. This report is presented in two volumes. Volume I contains the narrative, analysis, and conclusions. Volume II contains five supporting appendixes. Author

N85-12523*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
RECENT EXAMPLES OF MESOSCALE NUMERICAL FORECASTS OF SEVERE WEATHER EVENTS ALONG THE EAST COAST
Paul J. Kocin, Louis W. Uccellini, John W. Zack, and Michael L. Kaplan Nov. 1984 66 p refs
(NASA-TM-86172; NAS 1.15:86172) Avail: NTIS HC A04/MF A01 CSCL 04B

Mesoscale numerical forecasts utilizing the Mesoscale Atmospheric Simulation System (MASS) are documented for two East Coast severe weather events. The two events are the thunderstorm and heavy snow bursts in the Washington, D.C. - Baltimore, MD region on 8 March 1984 and the devastating tornado outbreak across North and South Carolina on 28 March 1984. The forecasts are presented to demonstrate the ability of the model to simulate dynamical interactions and diabatic processes and to note some of the problems encountered when using mesoscale models for day-to-day forecasting. Author

N85-12524# Army Cold Regions Research and Engineering Lab., Hanover, N. H.
ICING RATE ON STATIONARY STRUCTURES UNDER MARINE CONDITIONS
K. Itagaki Jun. 1984 13 p
(DA Proj. 4A1-61102-AT-24)
(AD-A145795; CRREL-84-12) Avail: NTIS HC A02/MF A01 CSCL 04/2

Icing on stationary structures such as oil rigs is becoming an increasingly serious problem as offshore drilling operations in the subpolar regions become more common. Little information exists on this subject. Extensive observations have been made of icing on the upper structures of moving ships, but the complexity of this problem makes analysis of the results very difficult. Even the generation of water drops in this case involves many factors, such as windspeed, wave direction relative to the bearing of the ship, and size and free-board of the ship. On stationary structures, however, the problem is much simpler, since the major factor in drop generation is whitecaps produced by wind, and no motion of the structure is involved. In the present study, a theoretical calculation was made by combining the data available on the generation of drops by wind with data on the proportion of ice frozen from the collected water. The rate of ice accumulation on stationary structures was calculated using published data. The results were compared with icing measured on board ships. Although the general trend of this calculation indicated parallelism with the onboard measurements, the measured ice accumulation rate on ships needed a 5 to 8 m/s higher windspeed to correspond with the calculated rate for stationary structures. GRA

N85-12525# Rice Univ., Houston, Tex. Dept. of Space Physics and Astronomy.
ON THE CAUSE OF X-LINE FORMATION IN THE NEAR-EARTH PLASMA SHEET: RESULTS OF ADIABATIC CONVECTION OF PLASMA-SHEET-PLASMA
G. M. Erickson Hanscom AFB, Mass. AFGL 24 Apr. 1984 27 p
(Contract F19628-83-K-0016)
(AD-A145835; AFGL-TR-84-0134; SR-1) Avail: NTIS HC A03/MF A01 CSCL 04/2

Self-consistent, static-equilibrium solutions are presented for two-dimensional magnetospheric-magnetic-field configurations with isotropic thermal pressure. These solutions include a dipole field and are not restricted to the asymptotic theory. Adiabatic convection of plasma sheet flux tubes is modeled as a series of static-equilibrium solutions in which flux tubes conserve their PV(gamma) as they convect, which resulted in time dependent magnetospheric configurations. Specifically, it is found that a deep minimum in the equatorial B sub z develops in the inner plasma sheet, thereby causing the magnetic-field configuration to become more stretched and tail-like in time. These results suggest X-line formation in the inner plasma sheet as a consequence of lossless, adiabatic convection of plasma sheet flux tubes. Author (GRA)

N85-12526# Mitre Corp., Bedford, Mass.
USE OF PROTOTYPING FOR MAN-MACHINE INTERFACE REQUIREMENTS DEFINITION ON THE AWDS (AUTOMATED WEATHER DISTRIBUTION SYSTEM) PROGRAM Final Report
C. W. Benkley Aug. 1984 151 p
(Contract F19628-84-C-0001)
(AD-A146033; MTR-9234; ESD-TR-84-178) Avail: NTIS HC A08/MF A01 CSCL 09/2

This paper describes how prototyping was used as an aid in defining man-machine interface requirements for the Automated Weather Distribution System (AWDS). Ways in which man-machine interface prototyping (MMI) can be used on system acquisition programs in general are also discussed. The study focused on: (1) prototyping three candidate MMI models (command line syntax; prompted entry; menu-driven entry) for graphic processing; and (2) identifying methods by which the amount of displayed graphic information can be maximized without sacrificing clarity of presentation. GRA

N85-12527# State Univ. of New York, Albany. Atmospheric Sciences Research Center.
ATMOSPHERIC EXTINCTION IN CRITICAL ENVIRONMENTS Final Report, 1 Dec. 1980 - 31 May 1984
G. G. Lala and M. B. Meyer 1 Aug. 1984 50 p
(Contract DAAG29-81-K-0019)
(AD-A146102; ARO-17383.8-GS) Avail: NTIS HC A03/MF A01 CSCL 04/2

The transmission of light in the atmosphere is strongly influenced by the presence of aerosols, haze and fog drops and precipitation particles. The purpose of this program was to obtain data on light transmission and corresponding measurements of aerosol and droplet size distributions under various meteorological conditions. These data provide a basis for the theoretical study of the relation of extinction to atmospheric constituents and provide the necessary data for the initialization and verification of models. The field study of radiation fog was a major part of the program which included measurements of surface layer and boundary layer variables, mesoscale meteorological fields, aerosol and fog microphysics as well as light extinction at visible and infrared wavelengths. This program was cooperative in nature involving participants from nine research organizations. As a result of this field program, an extensive data base was compiled which includes 34 cases of fog and haze as well as 17 precipitation events. GRA

N85-12528# Scripps Institution of Oceanography, La Jolla, Calif. Visibility Lab.
CHARACTERISTICS OF AEROSOL VOLUME DISTRIBUTIONS MEASURED AT MEPPEN, W. GERMANY Interim Report
B. W. Fitch Oct. 1983 25 p
(Contract F19628-82-C-0060)
(AD-A146138; SIO-REF-84-9; AFGL-TR-83-0270; SR-4) Avail: NTIS HC A02/MF A01 CSCL 04/2

Measurements of the number and size distribution of the atmospheric aerosol were made at ground level at Meppen, W. Germany using two optical particle counters. The aerosol was measured infrequently from July, 1977, through March, 1978, over the particle radius range 0.21-5.9 micrometers using a Royco model 220 particle counter. A Particle Measuring System ASAS 300B aerosol particle counter measured the aerosol over a similar radius range every hour and, often, every half-hour from 14 March through 9 May, 1978. This report discusses the behavior and characteristics of the Meppen aerosol distribution compared to an extensive set of airborne measurements of the aerosol in the lower troposphere at nine sites in Europe, including Meppen, and the use of local meteorological observations to estimate the local particle size distribution. Volume distribution plots and the results of a model fit using log-normal distributions show good agreement between the airborne and ground data sets. Both data sets show three volume modes, each well fit by a log-normal distribution. The behavior and values of the log-normal fit parameters for the accumulation and middle modes are in good agreement between the two data sets. The greater frequency of occurrence, and, generally, bigger size of the ground coarse modes compared to the airborne coarse modes indicates a larger average particle number concentration for the ground measured modes. The data show that each of the three modes is not equally affected by changes in relative humidity. The middle mode is the most sensitive and the coarse mode is the least sensitive. It appears that the relative humidity sensitive middle mode must be present for the formation of a mist or fog. Author (GRA)

N85-12529# National Aeronautical Establishment, Ottawa (Ontario).
AIRCRAFT FLOW EFFECTS ON CLOUD DROPLET IMAGES AND CONCENTRATIONS Aeronautical Note
A. M. Drummond Jun. 1984 38 p
(AD-A146176; NAE-AN-21; NRC-23508) Avail: NTIS HC A03/MF A01 CSCL 04/2

Cloud physics measurements by the Twin Otter aircraft are affected to some degree by local flow effects from the wing and from the probe canister. Droplet images and concentration are distorted in the worst case by no more than 20% for an aircraft

lift coefficient (C sub L) of 0.75 and by only a few percent for low values of C sub L. Corrections for a Particle Measuring Systems probe mounted on a short pylon at the inboard spanwise location have been given which are based on an experimentally verified model for the flow velocity. GRA

N85-12530# Naval Postgraduate School, Monterey, Calif.
DEVELOPMENT OF A MICROCOMPUTER COUPLED ATMOSPHERIC AND OCEANIC BOUNDARY LAYER PREDICTION MODEL M.S. Thesis
G. L. Tarbet Dec. 1983 53 p
(AD-A146334) Avail: NTIS HC A04/MF A01 CSCL 04/2

A coupled Marine Atmospheric Boundary Layer (MABL) and Oceanic Boundary Layer (OBL) model is developed using the Naval Postgraduate School and Garwood models respectively. All coding is done on the Hewlett-Packard 9845 microcomputer with emphasis on ease of use. The model is used to explore cases when feedback between the boundary layers significantly influences model forecasts. The sensitivity of the model to slight input variations is explored. Light wind situations where stratus or fog formation is extremely difficult to predict is investigated. Cases covered include variations in mixed layer depth and wind speed which produces significantly different forecasts from the initial input. Author (GRA)

N85-12531# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abteilung Wolkenphysik.
OPERATIONAL TEST OF THREE INSTRUMENTS FOR MEASURING LIQUID WATER CONTENT IN LABORATORY AND FROM AIRCRAFT
Heinz Loebel May 1984 67 p refs In GERMAN; ENGLISH summary
(DFVLR-Mitt-84-08) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 22.50

Three instruments for quantitative determination of liquid water content of clouds are described. Laboratory and flight measurements were carried out. Different methods of measuring and compensating are described, and the results of measurements during a campaign in winter are compared. Author (ESA)

N85-12532# National Bureau of Standards, Washington, D.C. Center for Building Technology.
FASTEST-MILE WIND SPEEDS IN HURRICANE ALICIA Final Report
R. D. Marshall Jun. 1984 71 p refs
(PB84-220771; NBS/TN-1197) Avail: NTIS HC A04/MF A01 CSCL 04B

Surface wind speeds recorded during the passage of Hurricane Alicia through the Galveston-Houston area on August 18, 1983, are used to estimate the fastest-mile wind speeds at 10 m above ground in open terrain. The relationships between wind speeds for various averaging times and the boundary-layer representations used in the transformation to fastest-mile speeds are described. These speeds are compared with wind speeds recommended for the design of buildings and other permanent structures. Errors inherent in the original wind speed records and in the transformations are estimated. Author (GRA)

N85-12533# National Weather Service, Garden City, N.Y.
PLOTTING TDL COASTAL WIND FORECASTS
P. Severe Jun. 1984 39 p
(PB84-220789; NOAA-NWS-ERCP-22-REV; NOAA-84071801) Avail: NTIS HC A03/MF A01 CSCL 04B

Ordinarily, the TDL coastal wind forecasts are presented as alphanumeric messages. The user must rely on coded letters and numbers to visualize a pictorial display of the given information in his/her mind. Unless used daily, the locations of the forecast points and their coded names, could become confused and/or forgotten by the user. As this continues, the effectiveness of the coastal wind forecasts diminishes. This program is designed to transform the alphanumeric data given in the forecasts into four plotfiles which can be displayed on the Graphics Display Module via PMOD. This program is the first step towards alleviating the task of memorizing locations on the part of the user. Author (GRA)

N85-12212# Joint Publications Research Service, Arlington, Va.
ACHIEVEMENTS IN DEVELOPMENT OF SPACE METEOROLOGY
V. Zakhariev *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-038) 25 Oct. 1984 p 7-13 ref Transl. into ENGLISH from Spisanie na Bulgar. Akad. na Naukite (Sofia), no. 3, 1984 p 16-21 (For primary document see N85-12210 03-31)
Avail: NTIS HC A04/MF A01

N85-12409 Ceskoslovenska Akademie Ved, Prague. Inst. of the Physics of the Atmosphere.
THE EXTREMENESS OF THE COLD FRONT OF DECEMBER 31, 1978 OVER THE CSR
Frantisek Rein and Josef Stekl *In its* Geophys. Works During 1981, Vol. 29, No. 547-566 1984 p 375-404 refs (For primary document see N85-12389 03-42)
(Rept-566) Avail: Issuing Activity

N85-12424# Centre Oceanologique de Bretagne, Brest (France).
WIND SPEED DETERMINATION FROM RADAR ALTIMETERS
P. Queffeulou *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 31-35 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N85-12534 National Maritime Inst., Feltham (England).
THE ESTIMATION OF PERSISTANCE STATISTICS FROM CUMULATIVE PROBABILITIES OF WAVE HEIGHT
S. Kuwashima (Tokyo Univ. of Mercantile Marine) and N. Hogben May 1984 77 p refs Sponsored by United Kingdom Dept. of Industry Maritime Technology Committee and Mechanical and Electrical Requirements Board
(NMI-R183) Copyright. Avail: Issuing Activity

A method for estimating persistence statistics from cumulative probabilities of wave height was developed to estimate persistence statistics as an output for the NMIMET wave climate synthesis program so that they can be derived on a worldwide basis. The technique is based on Graham's method, modified after examination of measured data sets. The method is shown to be more reliable and much simpler to apply than Graham's, and to give good results for exceedance and nonexceedance. The measured data used for validation include sets in areas remote from the sites in UK waters used for most of the development. Persistence statistics estimated using NMIMET output of wave height probabilities from visual wave date, and results from measured data were compared. Author (ESA)

N85-12535# Defence Research Information Centre, Orpington (England).
THE STRUCTURE OF THE ICELAND-FAEROE RIDGE, DERIVED FROM GEOPHYSICAL MEASUREMENTS
U. Fleischer, F. Holzkamm, K. Vollbrecht, and D. Voppel Jun. 1984 58 p refs Transl. into ENGLISH of Deut. Hydrograph. Z. (West Germany), v. 3, no. 27, 1974 p 97-113
(DRIC-T-7255; BR92338) Avail: NTIS HC A04/MF A01

A gravimetric-magnetic and bathymetric survey was carried out along the Iceland-Faeroe Ridge. The ridge runs at right angles to the Mid-Atlantic Ridge, exhibits a smoother surface, and forms a barrier between the water masses of the North Sea and the Atlantic Ocean. Author (ESA)

N85-12536# Woods Hole Oceanographic Institution, Mass.
THE LONG TERM UPPER OCEAN STUDY (LOTUS). CRUISE SUMMARY Hydrographic Data Report, Oct. 1983 - Jan. 1984

E. T. Montgomery, N. J. Pennington, and M. G. Briscoe Jul. 1984 72 p
(Contracts N00014-76-C-0197; N00014-84-C-0134)
(AD-A145767; AD-E401229; WHOI-84-26; O-141; O-145) Avail: NTIS HC A04/MF A01 CSCL 08/10

OCEANUS cruises 141 (28 October - 4 November 1983) and 145 (22-29 January 1984) were the tenth and eleventh cruises to the Long Term Upper Ocean Study (LOTUS) area centered at 34 N, 70W. During OCEANUS 141, a C. S. Draper labs profiling current meter (PCM) was set, the fifth LOTUS surface mooring was recovered, and the deployment of the sixth LOTUS surface mooring was unsuccessfully attempted. The sixth surface mooring was finally deployed in January, on OCEANUS 145. This report provides details of the work accomplished on both cruises, as well as presenting the hydrographic data collected. GRA

N85-12537# Naval Academy, Annapolis, Md.
VARIATIONS WITH TIME OF THE CARBON DIOXIDE PARTIAL PRESSURE IN CENTRAL AND SOUTH ATLANTIC SURFACE WATERS Final Report, 1983 - 1984
B. Lipphardt, Jr. 25 May 1984 29 p
(AD-A145825; USNA-TSPR-130) Avail: NTIS HC A03/MF A01 CSCL 08/10

Increasing levels of atmospheric carbon dioxide have been hypothesized to cause future global warming as a result of an enhanced greenhouse effect. Man is responsible for the addition of carbon dioxide to the atmosphere through the burning of fossil fuels and the removal of vegetation from the continents. Future climatic changes caused by a global warming are of governmental concern because of their economic impact, and possible future restrictions on the use of fossil fuels are likely to result. It has been suggested that the carbonate system in the oceans may act as a carbon dioxide sink by converting excessive atmospheric carbon dioxide to dissolved ions. The role of the oceans as a carbon dioxide sink has not been clearly established, however. A study of time variation of surface ocean carbon dioxide levels is necessary to determine whether or not the oceans absorb significant quantities of atmospheric carbon dioxide. Three existing data sets are used to construct time variation studies covering 9 and 15 year intervals. The resulting comparisons show that oceanic carbon dioxide levels do not consistently increase with time, although some significant increases are noted. One comparison suggests that the geographic location of local carbon dioxide sources and sinks may by changing with time. Studies covering a larger time interval are necessary to establish more clearly the response of the oceanic surface layer to increasing atmospheric carbon dioxide levels. GRA

N85-12538# Lamont-Doherty Geological Observatory, Palisades, N. Y.
PHYSICAL OCEANOGRAPHY REPORT. HELICOPTER-BASED STD DATA FROM MIZEX 83 (MARGINAL ICE ZONE EXPERIMENT) Technical Report
T. O. Manley, D. Camp, K. Hunkins, and W. Tiemann Sep. 1984 148 p
(Contract N00014-76-C-0004)
(AD-A145848; LDGO-84-3) Avail: NTIS HC A07/MF A01 CSCL 08/10

During the 1983 Marginal Ice Zone Experiment (MIZEX 83) located in the Fram Strait, both ship and helicopter-based C/STD's were used to define the finescale and larger oceanographic structures within the operational area. This technical report outlines the acquisition and data reduction programs for the 120 helicopter-based stations taken during that time period. Very little manipulation was done to the data to finalize it, since both helicopter C/STD's showed very little deviation from pre- and post-cruise calibrations. The only exception was the calibration equation offsets for conductivity on both instruments. For these offset determinations, bottle and intercalibration data were used to define the coefficients. Response time of the temperature sensor was corrected for thermal lag constant until descending and ascending parts of the cast on a T-S diagram were nearly congruent. Standard level listings of temperature, potential temperature, salinity, sigma-t, specific volume anomaly, dynamic height, and sound velocity are given for each cast along with plotted profiles of temperature, salinity and sigma-t. GRA

N85-12539# Florida Univ., Gainesville. Dept. of Coastal and Oceanographic Engineering.
PREDICTION OF WAVE HEIGHT OF WIND-GENERATED SEAS IN FINITE WATER DEPTH Final Report, Feb. 1983 - Mar. 1984
M. K. Ochi and W. C. Wang Sep. 1984 32 p
(Contract N00014-83-K-0157)
(AD-A145996; UFL/COEL-TR/052) Avail: NTIS HC A03/MF A01 CSCL 12/1

This paper presents a method to statistically predict peaks, troughs, and peak-to-trough excursions of waves in finite water depth such as waves in harbors, bays, and near-shore and offshore seas. The probability density functions are developed based on the concept that waves in finite water depth are a non-Gaussian random process with parameters which depends on the sea severity and water depth. As an example of application of the present method, numerical computations are carried out for water depth of 8.8 m (28.8 ft) in a sea of significant wave height of 3.2 m (104 ft). The results of computation show that the newly-developed probability density functions of peaks and troughs both reasonably agree with the histograms constructed from measured data obtained during the ARSLOE Project. Author (GRA)

N85-12540# Naval Research Lab., Washington, D. C.
PLANS FOR THE NRL/NORDA (NAVAL RESEARCH LABORATORY-NAVAL OCEAN RESEARCH AND DEVELOPMENT ACTIVITY) FINE-SCALE VARIABILITY EXPERIMENT - 1984 (FVX-84)
G. O. Marmorino, E. E. Rudd, J. P. Dugan, W. L. Brundage, and R. P. Mied 30 Jul. 1984 27 p
(AD-A146041; NRL-MR-5450) Avail: NTIS HC A03/MF A01 CSCL 08/10

The Naval Research Laboratory and the Naval Ocean Research and Development Activity plan to conduct a joint experiment during July and August, 1984, to investigate the variability of upper ocean properties on the fine-scale (10 m and smaller) in the vicinity of a front within the Subtropical Convergence Zone (30 deg 30 min N, 71 deg W). A major goal is measuring the distribution of patches of intense variability and exploring their relationship to the front and the internal wave field. Initial mesoscale characterization of the experiment area will be based on multiple AXBT flights. Subsequent fine-scale measurements will involve a towed chain of temperature and conductivity sensors, a Doppler current profiler, a yo-yo CTD (Conductivity Temperature Depth) and velocity profiler, and a freely drifting thermistor chain. GRA

N85-12541# Naval Polar Oceanography Center, Washington, D.C.
EASTERN-WESTERN ARCTIC SEA ICE ANALYSIS 1983 Reference Report
Jun. 1984 105 p
(AD-A146133) Avail: NTIS HC A06/MF A01 CSCL 08/12

These are approximately 7-days analysis of sea ice prepared by the Naval Polar Oceanography Center, Suitland, MD. Included are ice concentration and ice thickness (age). GRA

N85-12542# Institute of Oceanographic Sciences, Birkenhead (England).
PARAMETERIZING EXTREME STILL WATER LEVELS AND WAVES IN DESIGN LEVEL STUDIES
G. A. Aucock 1984 97 p refs
(IOS-183) Avail: NTIS HC A05/MF A01

The state of the art in parameterizing and estimating extreme still water level (SWL), extreme waves, and their combination for sea flood prevention projects is reviewed. Prediction methods based on analysis of extreme values of SWL, on joint probability, and on interpolation of extreme SWL estimates are discussed. Difficulties in predicting wave statistics, given the lack of observed wave data, are considered. Author (ESA)

N85-12543# Woods Hole Oceanographic Institution, Mass.
ABSTRACTS OF PAPERS SUBMITTED IN 1983 FOR PUBLICATION
A. I. Tabushka Jul. 1984 166 p
(PB84-217579; WHOI-84-11) Avail: NTIS HC A08/MF A01 CSCL 08A

Abstracts of research efforts in the following areas are presented: biology, chemistry, geophysics, geology, and oceanography. Specific topics include animal physiology, aquiculture, marine mammals, microbiology, population ecology, and dinoflagellates. In addition, there are abstracts on geochemistry, radiochemistry, plate tectonics, paleontology, petrology, acoustic signal processing, marine meteorology, and the ocean surface. R.S.F.

N85-12544# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
USING MEASURED VARIANCE OF SKYWAVE RADAR SEA-ECHO POWER SPECTRA TO ESTIMATE IONOSPHERIC DOPPLER BROADENING OF MEAN SPECTRA
R. M. Jones, J. P. Riley, and T. M. Georges May 1984 62 p refs
(PB84-21471; NOAA-TM-ERL-WPL-117; NOAA-84062803) Avail: NTIS HC A04/MF A01 CSCL 08C

A relation between ionospheric Doppler broadening of skywave sea-echo Doppler spectra and the normalized variance of such spectra is derived. It is shown that the normalized variance is largest at the first-order Bragg lines of the Doppler spectra, and varies with Doppler frequency in a way that depends on the ionospheric Doppler broadening. An accurate measurement of the mean Doppler spectrum and the mean variance spectrum would lead to an estimate of the ionospheric distortion and to its removal. Author (GRA)

N85-12425# Centre National d'Etudes Spatiales, Toulouse (France).
OCEAN WAVE PARAMETERS EXTRACTION USING SATELLITE SHORT-PULSE RADAR ALTIMETERS
N. M. Mognard *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 37-41 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

N85-12426# Service Meteorologique Metropolitan, Paris (France).
THE USE OF ALTIMETER DATA FOR SEA STATE FORECASTING
A. Guillaume *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 43-46 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

N85-12427# Institute of Oceanographic Sciences, Wormley (England).
THE IMPACT OF SATELLITE ALTIMETER DATA ON WAVE RESEARCH
D. J. T. Carter and P. G. Challenor *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 47-50 refs Sponsored by UK Ministry of Industry and ESA (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

N85-12437# Royal Netherlands Meteorological Inst., De Bilt.
IMPACT OF ERS-1 OBSERVATIONS ON WAVE FORECASTING IN THE NORTH SEA
E. Bouws, G. J. Komen, and G. J. L. Nooren (National Aerospace Laboratory, Amsterdam, Netherlands) *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 113-116 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

N85-12438# Norwegian Meteorological Inst., Blindern.
INTERCOMPARISON OF GEOS 3/SEASAT WAVE DATA AND WAVE MODEL DATA
A. Kjelaas (Stolt-Nielsen Seaway Submersibles A/S) and J. Guddal *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 117-120 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

N85-12439# Institute of Oceanographic Sciences, Wormley (England).
EXTRACTION OF WAVE PERIOD FROM ALTIMETER DATA
P. G. Challenor and M. A. Srokosz *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 121-124 refs Sponsored by ESA and UK Department of Industry (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N85-12545 Pennsylvania Univ., Philadelphia.
MAPPING OF MAMMALIAN ARRHYTHMIAS WITH THE CARDIAC LASER SCANNER Ph.D. Thesis
Stephen Michael Dillon 1984 371 p
Avail: Univ. Microfilms Order No. DA8417288

The first goal was to develop a high resolution cardiac impulse mapping system based on the optical signals produced by certain voltage sensitive dyes. The other aim, once such a device was realized, was to describe the initiation and maintenance of ventricular fibrillation. This latter problem was divided into examination of acute regional ischemia as an induction mechanism and the depiction of wavefront movement once fibrillation was initiated by timed extra stimuli. The optical mapping system, dubbed the cardiac laser scanner, uses a rapidly deflected laser spot to excite fluorescence from a large number of discrete sites on the heart. These sites are repeatedly probed by the laser spot and the fluorescence signals recorded to produce sampled records of fluorescent activity at each site on the heart. Since the dye transduced cardiac electrical activity into fluorescence these records are interpreted to yield the moments of electrical activation at each site. The activation moments are plotted to create isochronal maps of electrical wavefront movement. Dissert. Abstr.

N85-12546*# National Aeronautics and Space Administration, Washington, D. C.
ARCHITECTURE OF DERMATOPHYTE CELL WALLS: ELECTRON MICROSCOPIC AND BIOCHEMICAL ANALYSIS
Yoshinori Nozawa and Yasuo Kitajima Jul. 1984 29 p refs Transl. into ENGLISH from Japan. J. Med. Mycol. (Japan), v. 18, no. 1, 1977 p 3-15 Transl. by Scientific Translation Service, Santa Barbara, Calif. Original doc. prep. by Gifu Univ. School of Medicine, Japan
(Contract NASw-3542)
(NASA-TM-77441; NAS 1.15:77441) Avail: NTIS HC A03/MF A01 CSCL 06C

A review with 83 references on the cell wall structure of dermatophytes is presented. Topics discussed include separation and preparation of cell walls; microstructure of cell walls by electron microscopy; chemical composition of cell walls; structural model of cell walls; and morphological structure of cell walls. Author

N85-12547# Queen Elizabeth Coll., London (England). Dept. of Physics.
DETERMINATION OF BOUND WATER IN BIOLOGICAL TISSUE AND ENERGY DISSIPATED IN BOUND WATER BY LOW LEVEL MICROWAVES Final Scientific Report, 1977 - 1983
E. H. Grant Feb. 1984 28 p
(Contract N00014-77-G-0075)
(AD-A143101; AD-E500670) Avail: NTIS HC A03/MF A01 CSCL 06/18

The dielectric behavior of water and aqueous solutions of myoglobin, DNA and human serum low-density lipoprotein (LDL) has been investigated over a wide frequency range. By combining the measured complex permittivity of pure water at frequencies up to 70 GHz with literature values in the far infrared it is shown that the dielectric behavior of water may be characterized by a small subsidiary dispersion centered around 600 GHz, in addition to the well known microwave dispersion. The value of the infinite

frequency permittivity in respect of this principal dispersion region was found to be 5.74 + or - 0.31 at 20 C. Aqueous solutions of various forms of DNA were investigated between 2-18 GHz but no dielectric behavior was observed which could not be explained by classical dielectric theory. The interpretation of the dielectric measurements on aqueous solutions of myoglobin and LDL shows that both types of molecule, despite the large disparity in their size, attract a layer of irrotationally bound water of average width 1-2 molecules. GRA

N85-12548# National Bureau of Standards, Washington, D.C. Electrosystems Div.
ELECTRICAL PARAMETERS IN 60-Hz BIOLOGICAL EXPOSURE SYSTEMS AND THEIR MEASUREMENT: A PRIMER Final Report
M. Misakian Apr. 1984 47 p refs Sponsored in part by DOE (Contract EA-77-A-01-6010)
(PB84-217793; NBS/TN-1191) Avail: NTIS HC A03/MF A01; also available SOD as SN003-003-02581-0 CSCL 06F

Material is presented which is intended to provide assistance in the measurement of a number of electrical parameters that are of importance during bioeffects research involving 60 Hz electric and magnetic fields. The parameters that are considered are the electric field strength E, the magnetic induction or flux density B, field uniformity, harmonic content, phase relations between field components, and corona. Descriptions of the fields and methods for their laboratory generation are surveyed. It is shown that using relatively simple instrumentation, it is possible to characterize reasonably well the electric and magnetic fields used in animal exposure studies. R.S.F.

N85-12213# Joint Publications Research Service, Arlington, Va.
ACHIEVEMENTS IN BIOLOGY OUTLINED
Georgi Petkov *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-038) 25 Oct. 1984 p 14-15 Transl. into ENGLISH from Vecherni Novini (Sofia), 18 Aug. 1984 p 4 (For primary document see N85-12210 03-31)
Avail: NTIS HC A04/MF A01

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

N85-12549 United Kingdom Atomic Energy Authority, Risley (England).
DEPOSITION IN THE HUMAN LUNG DURING RESPIRATION OF SMALL PARTICLES SUSPENDED IN THE AIR
W. Findeisen 18 Jul. 1984 18 p ref Transl. into ENGLISH of "Uber das absetzen kleiner, in der luft suspendierter teilchen in der menschlichen lunge bei der atmung" West German report (BLL-Risley-TR-5021-(9091.9F)) Copyright. Avail: British Library Lending Div., Boston Spa, England

The number of particles of an aerosol that are filtered out at various points in the bronchial tree during passage through the airways of the human lung were examined. Filtering out occurs because the particles are deposited and adhering to the walls of the bronchi and bronchioles as a result of four processes. A solution for the problem of pulmonary inhalation only in rough terms and on a quantitative basis was investigated. The dimensions of an aerosol particle its effect to be deposited in large numbers in the manner described at various points in the lungs to be effective are examined. E.A.K.

N85-12550# California Univ., Davis. Dept. of Physical Education.
THE ROLE OF PHYSICAL AND PHYSIOLOGICAL CAPACITIES AND THEIR MODIFICATION ON THE TOLERANCE TO VARIOUS STRESS EXPERIENCED BY AIR FORCE PERSONNEL Final Report
E. Bernauer, P. A. Mole, and W. C. Adams 31 Jun. 1984 160 p (Grant AF-AFOSR-3510-78)
(AD-A145779; AFOSR-84-0787TR) Avail: NTIS HC A08/MF A01 CSCL 06/19

The final report addresses advances in anthropometric and physical conditioning that will improve physical fitness and orthostatic tolerance related to improvement in handling high sustained G (HGS) stress. Topics include: (1) Man, exercise and orthostasis, (2) Animal model response to HGS; and Man, thermal stress and physical performance. Five years of work are condensed in the report. GRA

N85-12551# Kansas Univ., Lawrence.
MECHANISMS OF OXYGEN TOXICITY AND METHODS OF PROTECTION Final Report, 15 Oct. 1975 - 15 Oct. 1978
M. D. Faiman 13 Aug. 1984 8 p
(Contract N00014-75-C-0160)
(AD-A145830) Avail: NTIS HC A02/MF A01 CSCL 06/20

The mechanism by which oxygen causes convulsions is not clear. Although man's biochemical changes in brain have been reported to occur as a result of oxygen exposure, these changes are not necessarily the cause of oxygen-induced convulsions. From in vivo studies in mice, inhibition of brain energy metabolism was not found. Furthermore, although oxygen caused an increased oxidation of pyridine nucleotides, the decrease in both NADPH and NADH in cerebral cortex was not-related to the susceptibility fo mice to oxygen convulsions. GABA in brain cortex was decreased by oxygen, however, this decrease did not influence the susceptibility of mice to oxygen convulsions. The most effective CNS protectants seem to be those agents containing a disulfide bridge in their molecular structure, and which can be reduced to thiols. Since thiols are good free radical scavengers, free radicals may be the initial event in provoking the insult to produce oxygen convulsions. GRA

N85-12552# Naval Health Research Center, San Diego, Calif.
CARDIOVASCULAR DISEASE AMONG U.S. NAVY PILOTS Interim Report
A. Hoiberg Jul. 1984 17 p
(AD-A145871; NAVHLTHRSCHC-84-27) Avail: NTIS HC A02/MF A01 CSCL 06/10

This study's objectives were: (1) to determine the influence of age on cardiovascular disease (CVD) incidence among U.S. Navy pilots diagnosed with CVD during a 12.5-year time period (n = 150); (2) to examine pilots' occupational variables as risk factors of CVD, and (3) to identify precursory diseases associated with CVD incidence. Results showed a direct relationship between CVD incidence and the risk factor of age. Also, pilots on the average were more than three years younger at the time of CVD onset than other Navy officers. None of the occupational factors was associated with CVD incidence although fighter pilots had the highest rates of acute myocardial infarction and chronic ischemic heart disease. Angina pectoris was most frequently observed as a precursory disease of chronic ischemic heart disease, and several behaviorally related disorders (e.g., alcoholism) occurred most frequently with hypertension. Subsequent research should include all U.S. military pilots to provide a larger population in which to examine the influence on CVD incidence of such occupational factors as high performance aircraft. Also recommended was the implementation of an intervention program designed to modify the life styles of pilots who had been hospitalized for hypertension or such behaviorally related disorders as obesity and alcoholism. Author (GRA)

N85-12553# New York Univ., New York. Neuromagnetism Lab.
VISUALLY EVOKED RESPONSES FROM NON-OCCIPITAL AREAS OF THE HUMAN CORTEX Publication Report
O. V. Lounasmaa, S. J. Williamson, L. Kaufman, and R. Tanenbaum 1984 7 p
(Contract N00014-76-C-0568)
(AD-A146079; Rept-16) Avail: NTIS HC A02/MF A01 CSCL 06/16

Visually evoked neuromagnetic responses from the central area of the cerebral cortex in addition to the usual responses from the occipital areas of primary visual cortex are observed

when the velocity of a moving grating pattern was modulated sinusoidally. The source of the central field has different functional properties than the source in primary sensory cortex. The position, depth, and orientation of the source are consistent with it lying in the Rolandic fissure near or in the eye representation area of motor cortex. GRA

N85-12554# Naval Health Research Center, San Diego, Calif.
EFFECT OF PHYSICAL WORK AND SLEEP LOSS ON RECOVERY SLEEP Final Report
P. Naitoh, C. E. Englund, D. H. Ryman, and J. A. Hodgdon Aug. 1984 22 p
(DA Proj. F58-528)
(AD-A146082; NAVHLTHRSCHC-84-30) Avail: NTIS HC A02/MF A01 CSCL 06/19

The effect of exercise and sleep loss on sleep was studied in four groups of young, physically fit, well-trained U.S. Marine Corps male volunteer subjects. In the first study, Study 1, ten pairs of Marines were observed. One member of each pair was assigned to an exercise routine and walked on a treadmill in full combat gear at a speed that induced an elevated heart rate corresponding to 30% of the individual's VO2 max. Exercise periods lasted half an hour per hour for two 17-hr long periods of continuous work, designated CW1 and CW2. The two CW episodes were separated by a 3-hr nap. Individuals assigned the exercise routine spent the second half of each hour in the CW period performing cognitive tasks using a computer terminal. The remaining member of each pair was assigned to a non-exercise, control routine. Study 1 consisted of two routines and data on the participants and were grouped as follows: (1) Nap/Exercise, and (2) Nap/No Exercise. In a second study, Study 2, eight pairs of Marines participated. In Study 2 the experimental protocol was identical with Study 1 with the exception that neither the exercising subject nor the control subject were permitted to nap between CW1 and CW2. GRA

N85-12555# New York Univ., New York. Neuromagnetism Lab.
EVIDENCE FOR MULTIPLE AREAS IN THE HUMAN AUDITORY CORTEX Publication Report
M. Pelizzone, S. J. Williamson, and L. Kaufman 1984 6 p
(Contract N00014-76-C-0568)
(AD-A146086; AD-E000599; Rept-18) Avail: NTIS HC A02/MF A01 CSCL 06/16

Neuromagnetic measurements of the transient responses to tone burst stimuli of different frequencies and of the response evoked by amplitude modulated tones in the steady state paradigm are compared on the same subjects. The activity underlying the dominant 100 ms component of the transient response to a tone burst is insensitive to the frequency of the tone. The activity evoked in the steady state paradigm is tonotopically organized and its source is shifted laterally from that of the tone bursts. These results show that it is possible with the neuromagnetic measurements to differentiate spatially and functionally different regions across the human auditory cortex. GRA

N85-12556# Naval Health Research Center, San Diego, Calif.
DIFFERENCES IN HEALTH RISKS BY AIRCRAFT MODEL AMONG US NAVY PILOTS
A. Hoiberg Aug. 1984 19 p
(AF Proj. F58528)
(AD-A146147; NAVHLTHRSCHC-84-28) Avail: NTIS HC A02/MF A01 CSCL 06/5

The purpose of this study was to identify health risks associated with eight aircraft models in a population of U.S. Navy pilots (n = 22,245) during a 12.5-year time period. Results showed that pilots in the trainer/miscellaneous group (< or = 35 years of age) had significantly higher hospitalization rates than other pilot groups for almost all diagnoses whereas reconnaissance pilots were distinguished from others by lower total hospitalization rates. Younger helicopter pilots had significantly higher hospitalization rates for joint diseases than four other pilot groups and significantly higher rates for nervous system disorders than attack and patrol/antisubmarine groups. Explanations for these and mortality rate results were provided by examining the influence of selection and retention criteria; age, experience, and exposure; pilot population characteristics; and aircraft model assignments. GRA

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N85-12557# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Psychology.
COGNITIVE COORDINATE SYSTEMS: ACCOUNTS OF MENTAL ROTATION AND INDIVIDUAL DIFFERENCES IN SPATIAL ABILITY
M. A. Just and P. A. Carpenter Sep. 1984 58 p
(Contract N00014-82-C-0027)
(AD-A146149; TR-84-1-ONR) Avail: NTIS HC A04/MF A01 CSCL 05/10

Strategic differences in spatial tasks can be explained in terms of different cognitive coordinate systems that subjects adopt. The strategy of mental rotation (of the type used in most mental rotation experiments and in some psychometric tests of spatial ability) uses a coordinate system defined by the standard axes of our visual world (i.e., horizontal, vertical, and depth axes). Within this strategy, rotations are performed around one or more of the standard axes. The paper provides a detailed theoretical account of the mental rotation of individuals of low and high spatial ability as they solve problems taken from psychometric tests. The theory is instantiated as two related computer simulation models that not only solve the problems, but also match the response times for the two groups. The simulation models contain modularized units of procedural knowledge called productions, that select and execute the appropriate actions at each knowledge state. Small localized differences between the two models simulate the large quantitative and qualitative differences between the two groups of subjects. GRA

N85-12558# Smith-Kettlewell Inst. of Visual Sciences, San Francisco, Calif.
VISUAL SELECTIVE ATTENTION Annual Scientific Report
K. Nakayama 30 Mar. 1984 4 p
(Grant AF-AFOSR-0320-83)
(AD-A146220; AFOSR-84-0774TR) Avail: NTIS HC A02/MF A01 CSCL 05/10

This technique has been used to differentially localize neural activity associated with sinusoidal grating onset and offset in different evidence that the field potentials recorded on the surface of the occipital lobe originate in an area other than the primary visual cortex. Because current source density analysis has such great ability to localize the origins of visual evoked potentials, this technique can also be applied to examine the origin of attention-related potentials. It is expected that the results of this study will aid in the interpretation of event-related potentials in humans. GRA

N85-12559# Illinois Univ., Champaign. Human Attention Research Lab.
INDIVIDUAL DIFFERENCES IN AUTOMATIC AND CONTROLLED INFORMATION PROCESSING
P. L. Ackerman and W. Schneider Aug. 1984 22 p
(Contract N00014-81-K-0034)
(AD-A146245; AD-E750896; HARL-ONR-8401) Avail: NTIS HC A02/MF A01 CSCL 05/10

This report discusses prediction of individual differences in task performance during and subsequent to task practice. Previous literature indicates that pre-practice prediction of post-practice performance declines rapidly as time-on-task increases (for both simple and relatively complex tasks). Based on these effects, traditional conceptions equating general intelligence with learning ability are inconsistent with performance data. The present approach views practice effects from an information processing

perspective. The distinction between two major types of practice effects is outlined and discussed with respect to the automatic and controlled processing framework. The thrust of the discussion of individual differences and practice is predicted on a theoretical organization which draws together theories of the structure of cognitive/intellectual abilities with aspects of resource theory and elements of automatic and controlled processing. A unified theory of practice is presented. The theory relates ability and performance individual differences to task component consistency characteristics. The supporting data of an experimental study of individual differences in initial, intermediate, and final practiced performance stages are reported. GRA

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N85-12560# Committee on Commerce, Science, and Transportation (U. S. Senate).
AIRLINER CABIN AIR QUALITY
Washington GPO 21 May 1984 4 p Rept. to accompany S. 197 presented to the Comm. on Com., Sci. and Transportation, 98th Congr., 2d Sess., 17 May 1984
(S-Rept-98-468; GPO-31-010) Avail: US Capitol, Senate Document Room

Air quality aboard commercial carriers was studied. Current Federal Aviation Administration procedures and regulations which are not adequate to ensure adequate fresh air in the cabins of commercial airliners are considered. The concern that equipment and procedures are not adequate to deal with smoke and toxic fumes from cabin fires were examined. The question as to whether the air quality in aircraft cabins conforms to nonaviation standards for locations that can be expected to accommodate large numbers of people in close proximity to one another is investigated. The seriousness of the study which is due to the fact that in an airliner cabin environment, an efficiently operating air conditioning system is an essential life support system. E.A.K.

N85-12561*# George Washington Univ., Washington, D.C.
NUTRITIONAL MODELS FOR SPACE TRAVEL FROM CHEMICALLY DEFINED DIETS
Patricia A. Dufour Washington NASA Nov. 1984 143 p refs (Contract NASw-3165)
(NASA-CR-3850; NAS 1.26:3850) Avail: NTIS HC A07/MF A01 CSCL 06H

Human nutritional requirements are summarized, including recommended daily intake and maximum safe chronic intake of nutrients. The biomedical literature on various types of chemically defined diets (CDD's), which are liquid, formulated diets for enteral and total parenteral nutrition, is reviewed. The chemical forms of the nutrients in CDD's are detailed, and the compositions and sources of representative commercial CDD's are tabulated. Reported effects of CDD's in medical patients, healthy volunteers, and laboratory animals are discussed. The effects include gastrointestinal side effects, metabolic imbalances, nutrient deficiencies and excesses, and psychological problems. Dietary factors contributing to the side effects are examined. Certain human nutrient requirements have been specified more precisely as a result of long-term use of CDD's, and related studies are included. CDD's are the most restricted yet nutritionally complete diets available. B.W.

N85-12562# Vermont Univ., Burlington.
THE EFFECTS OF HELICOPTER VIBRATION ON THE SPINAL SYSTEM Final Scientific Report, Jul. 1982 - Sep. 1983
M. H. Pope, D. Donnermeyer, D. G. Wilder, and M. Hundal Jul. 1984 59 p
(Contract DAMD17-82-C-2153; DA Proj. 3E1-62777-A-878)
(AD-A146274) Avail: NTIS HC A04/MF A01 CSCL 06/19

Initial work was performed to determine the objective correlates in vibration and posture as etiologic agents in low back pain in UH-1-H pilots. Existing pilot/UH-1-H cockpit relationships were measured and utilized in a UH-1-H cockpit simulator. Correlations were made between muscle EMG activity and force produced. Basic studies were performed to determine the effect of muscle fatigue on the muscle EMG activity. This basic work leads to work to be done studying the effects of the UH-1-H environmental factors on pain onset and duration. GRA

N85-12563# Naval Weapons Center, China Lake, Calif.
THE HUMAN OPERATOR AND SYSTEM EFFECTIVENESS Summary Report, Jun. 1982 - Jun. 1984
R. A. Erickson Jun. 1984 106 p
(AD-A146326; NWC-TP-6541) Avail: NTIS HC A06/MF A01 CSCL 05/5

This report develops the procedure to follow in producing a system effectiveness analysis, including the performance of the human operator(s) of the system. The report discusses the factors associated with each step in the procedure, including choice of measures of effectiveness, the form of system component performance data, and the characteristics of some mathematical models and analysis techniques. An example is used throughout the report to illustrate the guidelines. Both a simple listing, and a flow diagram summarize the procedures; more detailed guidelines are given in tables associated with steps in the procedure. GRA

55 PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

N85-12564*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CHANDRASEKHAR EQUATIONS AND COMPUTATIONAL ALGORITHMS FOR DISTRIBUTED PARAMETER SYSTEMS
John A. Burns (Virginia Polytechnic Inst. and State Univ.), Kazufumi Ito, and Robert K. Powers Sep. 1984 25 p refs
(Contracts NAS1-17070; NAS1-17130; Grant NSF ECS-81-09245)
(NASA-CR-172467; ICASE-84-50; NAS 1.26:172467) Avail: NTIS HC A02/MF A01 CSCL 12A

The Chandrasekhar equations arising in optimal control problems for linear distributed parameter systems are considered. The equations are derived via approximation theory. This approach is used to obtain existence, uniqueness, and strong differentiability of the solutions and provides the basis for a convergent computation scheme for approximating feedback gain operators. A numerical example is presented to illustrate these ideas. R.S.F.

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering.*

N85-12565# University of Southern California, Marina del Rey. Information Sciences Inst.
A RESEARCH PROGRAM IN COMPUTER TECHNOLOGY

Annual Technical Report, Jul. 1982 - Jun. 1983
K. W. Uncapher Jul. 1984 161 p
(Contracts F30602-81-K-0056; F49620-79-C-0181; MDA903-81-C-0335; Grant NSF MCS-79-18792)
(AD-A145776; ISI/SR-84-138) Avail: NTIS HC A08/MF A01 CSCL 09/2

This report summarizes the research performed by USC/Information Sciences Institute (ISI) from July 1, 1982 to June 30, 1983, for the Defense Advanced Research Projects Agency, the Air Force Office of Scientific Research, the National Science Foundation, and the Air Force Systems Command, Rome Air Development Center. The research is focused on the development of computer science and technology, which is expected to have a high DoD/military impact. ISI's broad spectrum of research covers the areas of communication technology, VLSI, software production technology, and user-friendly systems. During the past year, there has been a sustained effort to enhance the quantity, quality, and focus of ISI's research in order to anticipate and meet emerging national needs and for DARPA-supported work, there is special emphasis on emerging DoD/military needs. A continuing effort is underway to enhance the research base to track the growing impact of the information sciences on DoD and the country. High-bandwidth communications, knowledge-based and expert systems, and advanced extensions of the MOSIS system, related to major changes in manufacturing technology, represent new or augmented research programs. GRA

N85-12566# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
THE DESIGN AND PERFORMANCE ANALYSIS OF AN ARBITER FOR A MULTI-PROCESSOR SHARED-MEMORY SYSTEM M.S. Thesis
S. S. Merchant Aug. 1984 108 p
(Contract N00014-84-K-0357; Grant NSF ECS-83-10698; DARPA Order 3045)
(AD-A146074; LIDS-TH-1396) Avail: NTIS HC A06/MF A01 CSCL 05/1

A round-robin arbiter has been designed and implemented for sharing memory in a multi-processor system. A study is made, via analysis and simulation, of the performance of this arbiter under various load conditions. In particular, distributions are obtained for the waiting time of an arriving customer under various load conditions, and expressions are obtained for the idle time distribution and the mean busy time. The effect of a heavy or light user in the midst of other moderate users is also examined, as is the effect of longer guaranteed idle periods by individual customers after a service completion. Many of the results obtained with a round-robin arbiter are compared with those obtained using a first-come, first-served arbiter. In the course of doing this, a simple relation has been found between the waiting time distribution and the distribution of the number of customers in any discrete-time first-come, first-served system with a single work-conserving deterministic server. Author (GRA)

N85-12567# Dayton Univ., Ohio. Research Inst.
AN INEXPENSIVE MICROCOMPUTER FOR LABORATORY DATA ACQUISITION AND TEST EQUIPMENT CONTROL Interim Report, Jan. 1983 - Jan. 1984
G. A. Hartman and R. W. Tait Wright-Patterson AFB, Ohio AFWAL Jul. 1984 93 p
(AF Proj. 2307)
(AD-A146095; AFWAL-TR-84-4089) Avail: NTIS HC A05/MF A01 CSCL 09/2

A versatile, inexpensive laboratory data acquisition and control unit has been developed. A VIC-20 microcomputer is used in conjunction with an expansion chassis and plug in interfaces which make it applicable to a wide variety of real time laboratory control and data acquisition tasks. A system of this type can be built for much less than one thousand dollars. GRA

N85-12568# Army Missile Command, Redstone Arsenal, Ala. Advanced Sensors Directorate.
ON LINE DIGITIZER SOFTWARE Interim Technical Report
S. R. F. Sims Jun. 1984 173 p
(AD-A146249; AD-E950550; DRSMI/RE-84-17-TR) Avail: NTIS HC A08/MF A01 CSCL 09/2

This report describes the software developed to date for the On Line digitizer system. The software provides means to transfer digital imagery and auxiliary data to a host computer hard disk, to test system components and display the imagery and auxiliary data in various formats. The system digitizes analog video (RS-170 or RS-343) at a 10 MHz rate to eight bits and records 16 auxiliary analog channels for approximately 15 minutes on 28 track tape. Author (GRA)

N85-12569# Naval Postgraduate School, Monterey, Calif.
APPLICATION OF A SILICON COMPILER TO VLSI (VERY LARGE SCALE INTEGRATED CIRCUITS) DESIGN OF DIGITAL PIPELINED MULTIPLIERS M.S. Thesis
D. J. Carlson Jun. 1984 142 p
(AD-A146328) Avail: NTIS HC A07/MF A01 CSCL 09/2

The concept and application of silicon compilers is described. The process of employing the MacPitts silicon compiler to design an 8-bit pipelined digital multiplier is presented, and the resulting design is evaluated. The process of installing and debugging the MacPitts compiler and the Caesar VLSI graphics editor on the VAX 11/780 computing facilities at NPS is documented in appendices. Author (GRA)

N85-12570# Institute of Oceanographic Sciences, Wormley (England).
NUTSATSEA: AN ON LINE DATA REDUCTION PROGRAM LINKING A CHEMLAB CONTINUOUS FLOW ANALYSER TO A COMMODORE PET MICROCOMPUTER
D. J. Hydes 1984 32 p refs
(IOS-176) Avail: NTIS HC A03/MF A01

The linking of a Chemlab continuous flow analyzer to a Commodore PET microcomputer to provide on line data reduction via a CIL PUPI analog to digital converter and an amplifier-interface unit is described. A program for the determination of the micronutrients ammonia, nitrate-nitrite, phosphate and silicate in seawater is listed. Author (ESA)

N85-12571# Institute of Oceanographic Sciences, Birkenhead (England).
AN INTRODUCTION TO THE MIAS CONVERSION SYSTEM
S. G. Loch 1984 66 p ref
(IOS-184) Avail: NTIS HC A04/MF A01

The reformatting of oceanographic data (mostly on magnetic tape) to make it readable by a Honeywell 66/DPS300 implemented data base is described. Author (ESA)

N85-12572# Federal Compiler Testing Center, Falls Church, Va.
DIGITAL EQUIPMENT CORPORATION, PROFESSIONAL 350, COBOL-81 VERSION 2.1 Validation Summary Report
20 Jun. 1984 53 p refs 2 Vol.
(PB84-227602; OIT/FSTC-84/257) Avail: NTIS HC A04/MF A01 CSCL 09B

A Validation Summary Report (VSR) for the Digital Equipment Corp., COBOL-81 Version 2.1 running under the P/OS Version 2.0 with P/OS Tool Kit Version 2.0 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the Low-Intermediate level of FIPS PUB 21-1. The VSR is made up of several sections showing all the discrepancies found, if any. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

N85-12573# Federal Compiler Testing Center, Falls Church, Va.
DIGITAL EQUIPMENT CORPORATION, PROFESSIONAL 350, COBOL-81 VERSION 2.1 (COBOL TECHNICAL REPORT)
20 Jun. 1984 18 p refs 2 Vol.

(PB84-227719; OIT/FSTC-84/258) Avail: NTIS HC A02/MF A01 CSCL 09B

A Federal Software Testing Center (FSTC) technical report for the Digital Equipment Corp., COBOL-81 Version 2.1 running under the P/OS Version 2.0 with P/OS Tool Kit Version 2.0 provides a consolidated summary of the results obtained from the evaluation of the subject compiler against the Indexed I-0, Levels 1 and 2 Relative I-0, Level 2 of the 1974 COBOL Standard (X3.23-1974/ FIPS PUB 21-1). All the discrepancies found, if any, are given. GRA

N85-12574# Office of Software Development, Falls Church, Va.
NORTHERN TELECOM, INCORPORATED, NTI-585/565, ACOBOL/3 RELEASE 4.1 VERSION H(01) Validation Summary Report
10 May 1984 58 p
(PB84-228022; OIT/FSTC-84/220) Avail: NTIS HC A04/MF A01 CSCL 09B

A Validation Summary Report (VSR) for the Northern Telecom, Inc., ACOBOL/3 Release 4.1 Version H(01) running under of OMNITASK 4.1 Release 1A11C provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the Low-Intermediate level of FIPS PUB 21-1. All the discrepancies found are listed. An overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974 is included. A section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed are given. GRA

N85-12575# Office of Software Development, Falls Church, Va. Federal Software Testing Center.
NORTHERN TELECOM, INCORPORATED NTI-585/565, ACOBOL/3 RELEASE 4.1 VERSION H(01) (COBOL TECHNICAL REPORT)
8 May 1984 15 p
(PB84-228030; OIT/FSTC-84/222) Avail: NTIS HC A02/MF A01 CSCL 09B

A Technical Report for the Northern Telecom, Inc., ACOBOL/3 Release 4.1 Version H(01) running under the OMNITASK 4.1 Release 1A11C provides a consolidated summary of the results obtained from the evaluation of the subject compiler against the indexed 1-0 Level 1 of the 1974 COBOL Standard (X3.23-1974/ FIPS PUB 21-1). All the discrepancies found, if any, are given. GRA

N85-12576# Federal Compiler Testing Center, Falls Church, Va.
DIGITAL EQUIPMENT CORPORATION, DECSYSTEM-10, MODEL 1090-SMP, COBOL-74 V12B Validation Summary Report
23 Apr. 1984 54 p
(PB84-227941; OIT/FSTC-84/185) Avail: NTIS HC A04/MF A01 CSCL 09B

A validation Summary Report (VSR) for the running under the TOPS-10, Release 7.02 provides a consolidated summary of the results obtained from the validation subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the Low-Intermediate level of FIPS PUB 21-1. The VSR is made up of several sections showing all the discrepancies found, if any. These include an overview of the validation which lists all categories of discrepancies by level/ module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

N85-12577# Federal Compiler Testing Center, Falls Church, Va.
DATA GENERAL CORPORATION, ECLIPSE C350, AOS COBOL RELEASE 3.51
2 Apr. 1984 13 p refs
(PB84-227883; OIT/FSTC-84/192) Avail: NTIS HC A02/MF A01 CSCL 09B

A Federal Software Testing Center (FSTC) technical report for the Data General Corporation, AOS COBOL Release 3.51 running under the AOS Rev. 5.02 provides a consolidated summary of the results obtained from the evaluation of the subject compiler against the indexed I-0 of the 1974 COBOL Standard (X3.23-1974/ FIPS PUB 21-1). All the discrepancies found, if any are given. GRA

N85-12578# Office of Software Development, Falls Church, Va. Federal Software Testing Center.
CONVERGENT TECHNOLOGIES, NGEN CP001, CT COBOL VERSION 9.0 Validation Summary Report
23 Mar. 1984 72 p
(PB84-227784; OIT/FSTC-84/135) Avail: NTIS HC A04/MF A01 CSCL 09B

This validation summary report (VSR) for the Convergent Technologies, CT COBOL Version 9.0 running under CTOSS Version 9.0 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIBS PUB 21-1). The compiler was validated against the high intermediate level of FIPS PUB 21-1. The VSR is made up of several sections showing all the discrepancies found, if any. These include an overview of the validation which lists all categories of discrepancies by level/ module within X3.23-1974, a section relating the categories of discrepancies to each of the federal levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

N85-12579# Office of Software Development, Falls Church, Va. Federal Software Testing Center.
CONVERGENT TECHNOLOGIES, MEGA FRAME CTIX BASIC INTERPRETER VERSION 1.03 Validation Summary Report
29 Mar. 1984 15 p
(PB84-227776; OIT/FSTC-84/122) Avail: NTIS HC A02/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the Convergent Technologies, CTIX BASIC interpreter, Version 1.03 running under the CTIX 1.09j provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1978 BASIC Standard (X3.60-1978/FIPS PUB 66). The compiler was validated against the Minimal BASIC level of FIPS PUB 68, The VSR is made up of several sections showing all the discrepancies found, if any. These include an overview of the validation which lists all categories of discrepancies within X3.60-1978 and a detailed listing of discrepancies together with the tests which failed. GRA

N85-12580# Office of Software Development, Falls Church, Va. Federal Software Testing Center.
CONVERGENT TECHNOLOGIES, MEGA FRAME, CTIX FORTRAN 77 VERSION 2.1 Validation Summary Report
7 Mar. 1984 18 p
(PB84-227768; OIT/FSTC-84/121) Avail: NTIS HC A02/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the Convergent Technologies, CTIX FORTRAN 77 Version 2.1 running under the CTIX 1.09J provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1978 FORTRAN Standard (X3.9-1978/FIPS PUB 69). The compiler was validated against the Full level FORTRAN level of FIBS PUB 69, The VSR is made up of several sections showing all the discrepancies found, if any. These include an overview of the validation which lists all categories of discrepancies within X3.9-1978, and a detailed listing of discrepancies together with the tests which failed. GRA

N85-12581# Office of Software Development, Falls Church, Va. Federal Software Testing Center.
CONVERGENT TECHNOLOGIES, MEGA FRAME, CTIX COBOL VERSION 2.0 Validation Summary Report
29 Mar. 1984 82 p
(PB84-227750; OIT/FSTC-84/120) Avail: NTIS

HC A05/MF A01 CSCL 09B

Validation Summary Report (VSR) for the Convergent Technologies CTIX COBOL Version 2.0 running under the CTIX 1.09J provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the High level of FIPS PUB 21-1. The VSR is made up of several sections showing all the discrepancies found, if any. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

N85-12582# Office of Software Development, Falls Church, Va. Federal Software Testing Center.

DIGITAL EQUIPMENT CORP., VAX-11/782, VAX FORTRAN VERSION 4.0 Validation Summary Report

19 Jun. 1984 13 p

(PB84-227701; OIT/FSTC-84/259) Avail: NTIS HC A02/MF A01 CSCL 09B

Validation Summary Report (VSR) for the Digital Equipment Corp., VAX-FORTRAN Version 4.0 running under the VMS Version 4.0 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1978 FORTRAN Standard (X3.9-1978/FIPS PUB 69). The compiler was validated against the Full Level FORTRAN level of FIPS PUB 69. The VSR is made up of several sections showing all the discrepancies found, if any. These include an overview of the validation which lists all categories of discrepancies within X3.9-1978, and a detailed listing of discrepancies together with the tests which failed. GRA

N85-12583# Office of Software Development, Falls Church, Va. Federal Software Testing Center.

DIGITAL EQUIPMENT CORP., VAX/750, VAX COBOL VERSION 3.0 Validation Summary Report

19 Jun. 1984 58 p

(PB84-227693; OIT/FSTC-84/261) Avail: NTIS HC A04/MF A01 CSCL 09B

A Validation Summary Report (VSR) for the Digital Equipment Corp., VAX COBOL Version 3.0 running under the VAX/VMS Version 3.5 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the Low-Intermediate level of FIPS PUB 21-1. The VSR is made up of several sections showing all the discrepancies found-if any. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

N85-12584# Office of Software Development, Falls Church, Va. Federal Software Testing Center.

IBM CORPORATION, IBM 5381 MODEL 5, SYSTEM/38 COBOL RELEASE 6 Validation Summary Report

25 Jun. 1984 54 p

(PB84-227677; OIT/FSTC-84/290) Avail: NTIS HC A04/MF A01 CSCL 09B

A Validation Summary Report (VSR) for the IBM Corporation, System/38 COBOL Release 6 (5714-CB1) running under the System/38 Control Program Facility Release 6(5714-SS1) provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the Low-Intermediate level of FIPS PUB 21-1. The VSR is made up of several sections showing all the discrepancies found, if any. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

N85-12236# Joint Publications Research Service, Arlington, Va.

FUNCTIONAL CHECKING OF MICROPROCESSORS AND MICROPROCESSOR SYSTEMS Abstract Only

P. A. Arutyunov and N. B. Gomanilova *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 37 Transl. into ENGLISH from Mikroelektron. (Moscow), v. 13, no. 4, Jul. - Aug. 1984 p 356-366 (For primary document see N85-12215 03-31)

Avail: NTIS HC A04/MF A01

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N85-12585# National Aerospace Lab., Tokyo (Japan).

ON A PROGRAM FOR SOLUTION OF BCMP QUEUEING NETWORK MODEL

Kazuyo Suematsu and Shigeki Hatayama May 1984 27 p refs In JAPANESE; ENGLISH summary

(NAL-TR-813; ISSN-0389-4010) Avail: NTIS HC A03/MF A01

A program - called QNMAP - for solution of BCMP queueing networks with multiple closed and open subchains is described. For a given model, QNAMP computes average values of servers operating, queue length, queueing time and so on for all service centers and all classes of customers of each service center. Moreover, when analyzing the queueing network model of computer systems, the average values of TSS command response time and batch job elapsed time are computed. Numerical results for model of computer systems are shown. Author

N85-12586*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

A USER'S GUIDE TO THE FLEXIBLE SPACECRAFT DYNAMICS AND CONTROL PROGRAM

Joseph V. Fedor Jul. 1984 151 p refs

(NASA-TM-87389; X-712-84-8; NAS 1.15:87389) Avail: NTIS HC A08/MF A01 CSCL 09B

A guide to the use of the Flexible Spacecraft Dynamics Program (FSD) is presented covering input requirements, control words, orbit generation, spacecraft description and simulation options, and output definition. The program can be used in dynamics and control analysis as well as in orbit support of deployment and control of spacecraft. The program is applicable to inertially oriented spinning, Earth oriented or gravity gradient stabilized spacecraft. Internal and external environmental effects can be simulated. M.G.

N85-12587*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

DOCUMENTATION FOR THE MACHINE-READABLE VERSION OF A CATALOGUE OF EXTRAGALACTIC RADIO SOURCE IDENTIFICATIONS (VERON-CETTY AND VERON 1983)

Wayne H. Warren, Jr. Nov. 1983 19 p refs

(NASA-TM-87373; NSSDC/WDC-A-R/S-83-12; NAS 1.15:87373) Avail: NTIS HC A02/MF A01 CSCL 09B

Detailed descriptions of the data and reference files of the updated and final version of the machine-readable catalog are given. The computerized catalog has greatly expanded since the original published version (1974), and additional information is given. A separate reference file contains bibliographical citations ordered simultaneously by numerical reference and alphabetically by author. Author

N85-12588*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

DOCUMENTATION FOR THE MACHINE-READABLE VERSION OF THE REVISED AFGL INFRARED SKY SURVEY CATALOG (PRICE AND MURDOCK 1983)

Wayne H. Warren, Jr. May 1984 21 p refs

(NASA-TM-87377; NSSDC/WDC-A-R/S-84-05; NAS 1.15:87377) Avail: NTIS HC A02/MF A01 CSCL 09B

A detailed description of the machine-readable catalog as it is currently being distributed from the Astronomical Data Center is given. The catalog contains a main data file of 2970 sources and a supplemental file of 3176 sources measured at wavelengths of 4.2, 11, 20 and 27 microns. Author

N85-12589*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DOCUMENTATION FOR THE MACHINE-READABLE VERSION OF THE ANS ULTRAVIOLET PHOTOMETRY CATALOGUE OF POINT SOURCES (WESSELIUS ET AL 1982)
Wayne H. Warren, Jr. Aug. 1984 16 p refs
(NASA-TM-87379; NSSDC/WDC-A-R/S-84-10; NAS 1.15:87379) Avail: NTIS HC A02/MF A01 CSCL 09B

The machine-readable version of the Astronomical Netherlands Satellite ultraviolet photometry catalog is described in detail, with a byte-by-byte format description and characteristics of the data file given. The catalog is a compilation of ultraviolet photometry in five bands, within the wavelength range 155 nm to 330 nm, for 3573 mostly stellar objects. Additional cross reference data (object identification, UBV photometry and MK spectral types) are included in the catalog. R.S.F.

N85-12590# Princeton Univ., N. J. Dept. of Electrical Engineering and Computer Science.
SIGNAL PROCESSING ALGORITHMS Interim Scientific Report, 1 Aug. 1982 - 30 Jul. 1983
B. Liu 13 Oct. 1983 4 p
(Grant AF-AFOSR-0186-81)
(AD-A145748; AFOSR-84-0795TR) Avail: NTIS HC A02/MF A01 CSCL 17/2

This report summarizes research in the areas of auto-regressive model for spectrum estimation, steady state output error of the least mean square, and extrapolation of bandlimited signal in discrete-time. Papers produced during this period are listed. GRA

N85-12591# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
COMPUTER EQUIPMENT FOR RESEARCH IN STATISTICS Final Scientific Report, 15 Jun. 1983 - 14 Jun. 1984
P. R. Krishnaiah Aug. 1984 5 p
(Grant AF-AFOSR-0226-83)
(AD-A145755; AFOSR-84-0822TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

This grant purchased computer equipment to support basic research in multivariate analysis at the University of Pittsburgh. Some of the research areas to be supported by this equipment include the development of new methodology in multivariate analysis, techniques of data analysis in flight control problems, pattern recognition, and reliability and quality assurance. Author (GRA)

N85-12592# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
A METHODOLOGY FOR THE ANALYSIS OF PROGRAMMER PRODUCTIVITY AND EFFORT ESTIMATION WITHIN THE FRAMEWORK OF SOFTWARE CONVERSION Ph.D. Thesis
J. D. Fernandez May 1984 234 p
(AD-A145757; AFIT/CI/NR-84-44D) Avail: NTIS HC A11/MF A01 CSCL 09/2

Software conversion is becoming increasingly significant as the inventory of programs increases and as the life cycle of many applications becomes longer. Although some work has been done in the area of software conversion, it has received little research attention since it has only recently become a more frequent occurrence. This research considered two aspects of software conversion and developed a methodology for the statistical analysis of conversion sample data from the ongoing U.S. Air Force Base Level Data Automation Program. The two areas specifically addressed by this research were programmer productivity and effort estimation. Programmer attributes and program characteristics were studied in relation to programmer productivity in software conversion. Models for explaining productivity were constructed and the impact of organization was also considered. Existing applicable models for software conversion effort estimation were examined and their accuracy was evaluated. Environment specific regression models for effort estimation were also constructed. Several statistical and summarizing techniques were considered for the analysis of the conversion sample data. As various aspects of the data were studied, selected statistical techniques emerged as more appropriate. These provided the basis for the methodology formulated and used throughout the data analysis. The Air Force data was utilized in a case study of the application of the methodology. The analysis of conversion programmer productivity revealed that experience, lines of code, a programmer's knowledge of the program, organization, and other factors and attributes impacted productivity. GRA

N85-12593# Naval Ship Research and Development Center, Annapolis, Md. Computation Mathematics-Logistics Dept.
COMPUTER CENTER INTRODUCTORY REFERENCE MANUAL FOR CDC CYBER Final Report
D. V. Sommer May 1984 30 p
(AD-A145796; DTNSRDC/CMLD-84-09) Avail: NTIS HC A03/MF A01 CSCL 09/2

This Manual provides an introduction to the CDC CYBER NOS/BE Operating System for new users. Some information has been distilled from many individual documents and reflects usage at DTNSRDC. Control card examples and descriptions of some software are included. Author (GRA)

N85-12594# Minnesota Univ., Minneapolis.
DYNAMIC OCCLUSION ANALYSIS IN OPTICAL FLOW FIELDS Technical Report
W. B. Thompson, K. M. Mutch, and V. A. Berzins May 1984 23 p
(Contract F49620-83-C-0140; Grant NSF MCS-81-05215)
(AD-A145805; TR-84-6; AFOSR-84-0797TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Optical flow can be used to locate dynamic occlusion boundaries in an image sequency. Derived an edge detection algorithm sensitive to changes in flow fields likely to be associated with occlusions. The algorithm is patterned after the Marr-Hildreth zero-crossing detectors currently used to locate boundaries in scalar fields. Zero-crossing detectors are extended to identify changes in direction and/or magnitude in a vector-valued flow field. As a result, the detector works for flow boundaries generated due to the relative motion of two overlapping surfaces, as well as the simpler case of motion parallax due to a sensor moving through an otherwise stationary environment. It is then shown the approach can be extended to identify which side of a dynamic occlusion boundary corresponds to the occluding surface. The fundamental principal involved is that at an occlusion boundary, the image of the surface boundary moves with the image of the occluding surface. Such information is important in interpreting dynamic scenes. Results are demonstrated on optical flow fields automatically computed from real image sequences. Author (GRA)

N85-12595# Purdue Univ., Lafayette, Ind.
PROGRAMMING EFFORT ESTIMATION Final Report, 15 Feb. 1982 - 14 Aug. 1984
S. D. Conte, H. E. Dunsmore, and V. Y. Shen 14 Aug. 1984 10 p
(Contract DAAG29-82-K-0071)
(AD-A145839; ARO-18691.1-EL) Avail: NTIS HC A02/MF A01 CSCL 09/2

This research project investigates various models of programming effort estimation and prediction at various stages of the software development process. The project has led to several results and models. This report concentrates on results from the last year of our study (August, 1983 - August, 1984). Large-scale software development models are models that explain the effort in constructing software products involving a team of programmers. GRA

N85-12596# Naval Ocean Research and Development Activity, Bay St. Louis, Miss.
CONVERSION OF FEB (FAST AND EASY BINARY) UTILITIES TO ASCII FORTRAN Final Report
W. J. Teague Jun. 1984 25 p
(AD-A145840; AD-E001746; NORDA-TN-275) Avail: NTIS HC A02/MF A01 CSCL 09/2

Software for reading and writing of Fast and Easy Binary (FEB) files in ASCII format is documented in this report. The main FORTRAN-V FEB utilities were rewritten in ASCII FORTRAN and additional programs were developed for conversion of FEB files in FIELDATA format to FEB files in ASCII format, and vice versa. Implementation of these programs will allow FEB file software to continue to be supported by software updates and new additions on the UNIVAC 1180 operating system. GRA

N85-12597# Center for Naval Analyses, Alexandria, Va. Air Warfare Research Dept.
A SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM FOR SOLVING LARGE, SPARSE NONLINEAR PROGRAMS Professional Paper
R. H. Nickel and J. W. Tolle May 1984 153 p
(Contract N00014-83-C-0725)
(AD-A145854; CNA-PP-416) Avail: NTIS HC A08/MF A01 CSCL 09/2

This document describes the structure and theory for a sequential quadratic programming algorithm for solving large, sparse nonlinear optimization problems. Also provided are the details of a computer implementation of the algorithm, along with test results. The algorithm is based on Han's sequential quadratic programming method. It maintains a sparse approximation to the Cholesky factor of the Hessian of the Lagrangian and stores all gradients in a sparse format. The solution to the quadratic program generated at each step is obtained by solving the dual quadratic program using a projected conjugate gradient algorithm. Sine only active constraints are considered in forming the dual, the dual problem will normally be much smaller than the primal quadratic program and, hence, much easier to solve. An updating procedure is employed that does not destroy sparsity. Several test problems, ranging in size from 5 to 60 variables were solved with the algorithm. These results indicate that the algorithm has the potential to solve large, sparse nonlinear programs. The algorithm is especially attractive for solving problems having nonlinear constraints.
Author (GRA)

N85-12598# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.
AUTOMATING SOFTWARE DESIGN METRICS Final Report, Sep. 1982 - Sep. 1983
P. A. Szulewski, N. M. Sodano, A. J. Rosner, and J. B. DeWolf Feb. 1984 156 p
(Contract F30602-82-C-0130)
(AD-A145869; CSDL-R-1662; RADC-TR-84-27) Avail: NTIS HC A08/MF A01 CSCL 09/2

The Rome Air Development Center has developed the Software Quality Framework as a means to specify software quality goals and measure software quality. Much of the work to date has focused on metrics applicable to software code. This report describes an effort undertaken to measure the quality of software products earlier in the software development life cycle, during the design phase, and to automate the capture of metric data from design media. Metrics of software quality, primarily those related to the criterion simplicity (or conversely, complexity), were reviewed. This review includes those metrics previously developed in the Software Quality Framework. Two metrics, Halstead's Software Science and McCabe's Cyclomatic Complexity were chosen for their amenability to measurement during design and their potential for automation. Two design media were used: Design Aids for Real-Time Systems, an experimental automated design tool developed at the Charles Stark Draper Laboratory; and Ada as a program design language. GRA

N85-12599# Army Concepts Analysis Agency, Bethesda, Md.
EFFECTIVE DATE (E-DATE) MODEL DOCUMENTATION. CHANGES TO REFLECT MODEL ENHANCEMENT Final Report
J. J. Connelly and M. V. Lehmann Aug. 1984 89 p
(AD-A146050; CAA-D-84-5) Avail: NTIS HC A05/MF A01 CSCL 09/2

A compendium of changes has been developed for the Effective Date (E-DATE) Model documentation; reflecting a set of enhancements incorporated into the model. The changes are extensive and are in the form of short text changes, extended text insets and new linework. It is anticipated that these changes will be incorporated into the standing model documentation. Reference should be made to the controlling office for the status of this documentation revision. Author (GRA)

N85-12600# California Inst. of Tech., Pasadena.
NATFREQ USERS MANUAL: A FORTRAN 4 PROGRAM FOR COMPUTING NATURAL FREQUENCIES, MODE SHAPES AND DRAG COEFFICIENTS FOR TAUT STRUMMING CABLES WITH ATTACHED MASSES AND SPRING-MASS COMBINATIONS Final Report, Oct. 1982 - Sep. 1983
W. D. Iwan and N. P. Jones Jun. 1984 203 p
(Contract N62583-83-M-R084)
(AD-A146058; NCEL-CR-84.026) Avail: NTIS HC A10/MF A01 CSCL 09/2

This manual describes a computer program that has been developed to calculate natural frequencies and mode shapes of taut cables with attached masses and spring-mass combinations. The equations of motion are solved by an iterative technique allowing accurate calculation even for extremely high mode numbers. The approach has the advantages that it is fast, accurate, and can easily accommodate a variety of system configurations including bodies attached to the cable. This document covers the theory used in the development of the code. Line-by-line descriptions of both the input and output data are given, and several examples illustrating the use of the program are included. Some of the difficulties that may be encountered when running large, complex problems are discussed and possible solutions proposed. The structure of the program is described in moderate detail. The program is written in a style which makes additions or modifications easy to implement. Author (GRA)

N85-12601# Texas Univ., Austin. Center for Cybernetic Studies.
NEW LABELING PROCEDURES FOR THE BASIS GRAPH IN GENERALIZED NETWORKS
M. Engquist and M. D. Chang Jun. 1984 17 p
(Contracts N00014-81-C-0236; MDA903-83-K-0312)
(AD-A146217; CCS-RR-468) Avail: NTIS HC A02/MF A01 CSCL 12/1

Labeling procedures for the basis graph of a generalized network are introduced which build on procedures designed for pure networks. The various cases which arise in updating the basis graph are presented, and the efficiency of the related primal simplex implementation is discussed. GRA

N85-12602# Softech, Inc., Waltham, Mass.
ADVANCED ADA (TRADEMARK)
Jul. 1984 342 p
(Contract DAAB07-83-C-K514)
(AD-A146257) Avail: NTIS HC A15/MF A01 CSCL 09/2

This exercise provides concise review of some of the issues covered in the Ada Primer, so that the reader may be reacquainted with these basic features. This review also outlines the level of Ada that is assumed to have been learned by Advanced Ada Workbook readers. None of the material should seem new. Topics covered in the tutorial are: types, objects, control structures, subprograms, packages, separate compilation, visibility, and exceptions. GRA

N85-12603# Softech, Inc., Waltham, Mass.
REAL-TIME ADA (TRADEMARK)
Jul. 1984 103 p
(Contract DAAB07-83-C-K514)

(AD-A146258) Avail: NTIS HC A06/MF A01 CSCL 09/2

This section is designed to introduce the concepts of abstract concurrent programming, without reference to any particular language. The notion of process is explained, and a view of program execution as consisting of one or more processes is introduced. Some of the problems that have to be considered here, such as synchronization and mutual exclusion, are dealt with briefly. Concerns like deadlock and fairness are also introduced. Concurrent programming models systems where several activities are proceeding in parallel. In the real world, concurrent programming helps describe many situations where several threads of control execute more or less in an interrelated fashion. In the realm of computers, concurrent programming is necessary in operating system design, and increasingly in programming distributed systems. GRA

N85-12604# Washington Univ., Seattle. Dept. of Computer Science.

VLSI (VERY LARGE SCALE INTEGRATION) DESIGN TOOLS REFERENCE MANUAL, RELEASE 1.0 Interim Technical Report

1 Oct. 1983 155 p

(Contract MDA903-82-C-0424)

(AD-A146273; TR-84-08-06) Avail: NTIS HC A08/MF A01 CSCL 09/2

This report describes the use of the University of Washington/ Northwest VLSI Consortium's package of VLSI design tools. The tools described are: (1) High Level Circuit Design; Layout (Artwork Design for Circuits); Display Circuit Design; Geometric and Electric Rule Checking; Logic and Timing Simulation; (6) Circuit Extractors; and (7) Filters and Utilities. GRA

N85-12605# Naval Postgraduate School, Monterey, Calif.

AN INPUT TRANSLATOR FOR A COMPUTER-AIDED DESIGN SYSTEM M.S. Thesis

T. H. Carson Jun. 1984 121 p

(AD-A146337) Avail: NTIS HC A06/MF A01 CSCL 09/2

The purpose of this thesis is to design and implement the input translator for the Computer System Design Environment, which is a computer-aided design system. The Computer System Design Environment is used to design real time controllers for a variety of purposes. The input translator will take an input, which has been developed in the prescribed language, Control System Design Language, and with the aid of a partial syntax-directed editor, translate it into primitive list form. This form is used by the remainder of the system to select the best hardware and software components, as described in a set of realization libraries, to build the proposed controller. Author (GRA)

N85-12606# Los Alamos Scientific Lab., N. Mex.

CONFIGURATION MANAGEMENT FOR MISSION-CRITICAL SOFTWARE: THE LOS ALAMOS SOLUTION

G. Cort and D. M. Barrus 1984 15 p Presented at the Softool Users Group Meeting, Santa Barbara, Calif., 10 Sep. 1984

(Contract W-7405-eng-36)

(DE84-015515; LA-UR-84-2335; CONF-8409114-1) Avail: NTIS HC A02/MF A01

An approach to the utilization of the Softool Change and Configuration Control (CCC) environment is described. The steps taken to develop a very powerful development/configuration management environment (incorporating CCC) are outlined and justified. The extension of the Los Alamos system to management of large-scale projects is discussed. DOE

N85-12607# Centre National d'Etudes Spatiales, Toulouse (France).

EXPERIMENTING WITH THE ROLM Ada LANGUAGE WORKSHOP FOR SPECIFYING AND DESIGNING [EXPERIMENTATION DE L'ATELIER ADA DE ROLM EN PHASE DE: SPECIFICATION, CONCEPTION]

Martin Cousergue and Michele Pellizzari Jun. 1984 186 p refs In FRENCH Presented at DESS Training Session, Toulouse

Avail: NTIS HC A09/MF A01

The utilization of Ada Language in specifying and designing large real time computer programs for space studies applications is discussed. Comparison with languages such as SADT for specifications and PDL for designing, are made. The Ada development environment is presented theoretically and as a quality analysis. It is shown that Ada is not acceptable for program specifications, but quite adequate for designing. Author (ESA)

N85-12608# Maschinenfabrik Augsburg-Nuernberg A.G., Augsburg (West Germany). Lab. fuer Werkzeugmaschinen und Betriebslehre.

DEVELOPMENT OF A MODULAR MULTICOORDINATE MEASURING SYSTEM WITH CONTINUOUS-PATH MICROPROCESSOR CONTROL Final Report, Oct. 1981

Eberhardt Schmeer and Wolfgang Schmatz Bonn Bundesministerium fuer Forschung und Technologie Jul. 1984 57 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-84-158; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 12

A four axis coordinate gauging machine was developed. A pump wheel and a metal fitting were measured. Continuous-path control allows orthogonal contact whatever position the surface of the workpiece is in. The workpiece need not to be lined up. For manual operation, software for user-guidance is available. For automatic operation, programming with NCMES is envisaged. The whole system being modular, computers and controls are compatible with gauging machines of different makes. Author (ESA)

N85-12609# Oxford Univ. (England). Dept. of Engineering Science.

CONTROL: A SUITE OF INTERACTIVE TRANSFER-FUNCTION ANALYSIS PROGRAMS

D. W. Clarke 1984 38 p

(OUEL-1527) Avail: NTIS HC A03/MF A01

FORTRAN programs runnable on DEC VAX and PDP11 computers for graphical analysis of single-input/single-output feedback systems specified as transfer-functions are describe. Plotting programs for Nyquist and Bode frequency-response graphs, for root-locus diagrams and for step-responses of open and closed-loop plant are outlined. The plant can be combined with an optional and separately specified controller. The programs can operate with plant models which include dead-time. Programs implement the Routh-Hurwitz stability test and simplify models to obtain a reduced-order representation. At each stage a list of mnemonic options is automatically displayed. On option is always the mnemonic for help and, if selected, an explanatory list of the meanings of all current options is produced. The use of a command-driven interactive language means that proposed control systems can be rapidly and effectively assessed. Author (ESA)

N85-12610# National Bureau of Standards, Washington, D.C. Statistical Engineering Div.

DATAPLOT: IMPLEMENTATION TAPES GUIDE

J. J. Filiben Jul. 1984 79 p refs

(PB84-214063; NBS/DF-84/003A) Avail: NTIS HC A05/MF A01 CSCL 09B

DATAPLOT is a high-level (free-format English-like syntax) language for graphics (continuous or discrete), fitting (linear or non-linear), general data analysis and mathematics. The DATAPLOT Implementation Tapes Guide provides instruction and guidance for implementing DATAPLOT. GRA

N85-12448# Scott Polar Research Inst., Cambridge (England).

SIMULATION OF WAVEFRONTS RETURNED BY REALISTIC SURFACES

E. Novotny, A. P. R. Cooper, and M. R. Gorman *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 171-170 (For primary document see N85-12419 03-43)

Avail: NTIS HC A12/MF A01

62 COMPUTER SYSTEMS

Includes computer networks.

N85-12611# Integrated Systems, Inc., Palo Alto, Calif.
ANALYSIS AND DESIGN METHODOLOGY FOR VLSI COMPUTING NETWORKS Final Report
H. Lev-Ari Aug. 1984 147 p
(Contract N00014-83-C-0377)
(AD-A146030; ISI-46) Avail: NTIS HC A07/MF A01 CSCL 09/2

Several methods for modeling and analysis of parallel algorithms and architectures have been proposed in the recent years. These include recursion-type methods, like recursion equations, z-transform descriptions and do-loops in high-level programming languages, and precedence-graph-type methods like data-flow graphs (marked graphs) and related Petri-net derived models. Most efforts have been recently directed towards developing methodologies for structured parallel algorithms and architectures and, in particular, for systolic-array-like systems. Some important properties of parallel algorithms have been identified in the process of this research effort. These include executability (the absence of deadlocks) pipelinability, regularity of structure, locality of interconnections, and dimensionality. The research has also demonstrated the feasibility of multirate systolic arrays with different rates of data propagation along different directions in the array. This final report presents a new methodology for modeling and analysis of parallel algorithms and architectures. This methodology provides a unified conceptual framework, which is called modular computing network, that clearly displays the key properties of parallel systems. GRA

N85-12612# Stanford Univ., Calif. Dept. of Operations Research.
REGENERATIVE SIMULATION METHODS FOR LOCAL AREA COMPUTER NETWORKS
P. J. Haas and G. S. Shedler Jun. 1984 40 p
(Contract DAAG29-84-K-0030)
(AD-A146197; ARO-20927.1-MA) Avail: NTIS HC A03/MF A01 CSCL 09/2

Local area computer network simulations are inherently non-Markovian in that the underlying stochastic process cannot be modeled as a Markov chain with countable state space. We restrict attention to local network simulations with an underlying stochastic process that can be represented as a generalized semi-Markov process (GSMP). Using new better than used distributional assumptions and sample path properties of the GSMP, we provide a geometric trials criterion for recurrence in this setting. We also provide conditions which ensure that a GSMP is a regenerative process and that the expected time between regeneration points is finite. Steady-state estimation procedures for ring and bus network simulations follow from these results. GRA

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support.*

N85-12613# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
RESEARCH IN KNOWLEDGE REPRESENTATION FOR NATURAL LANGUAGE UNDERSTANDING Annual Report, 1 Sep. 1983 - 31 Aug. 1984
C. Sidner, B. Goodman, A. Haas, M. Moser, and D. Stallard Sep. 1984 197 p
(Contract N00014-77-C-0378)
(AD-A145807; BBN-5694) Avail: NTIS HC A09/MF A01 CSCL 05/7

This project is aimed at developing techniques for rendering computer-based assistance to a decision maker who is attempting to understand and react to a complex, evolving situation. This report summarizes our research in knowledge representation and natural language over the past three years. In particular, we discuss the development of KL-ONE, NIKL, and KL-TWO, the advances in RUS and the PSI-KLONE systems, and our work in understanding discourse and speaker's intentions. The report also contains a number of papers on different areas of our research: the interface of KL-TWO, the NIKL environment, semantic acquisition, a model of planning with time and events, recognizing intentions in discourse and understanding references in the face of miscommunication. We also document publications and presentations by members of the research group over the past year. GRA

N85-12614# SRI International Corp., Menlo Park, Calif.
TEST-BED FOR PROGRAMMABLE AUTOMATION RESEARCH. PHASE 1 Final Report, 1 Sep. 1982 - 31 Mar. 1984
R. C. Smith, R. C. Bolles, J. H. Herson, J. K. Myers, and D. Nitzan Apr. 1984 94 p
(Contract F49620-82-K-0034)
(AD-A145872; AFOSR-84-0776TR) Avail: NTIS HC A05/MF A01 CSCL 09/2

The goals of this project were to: explore and develop programmable automation techniques for robot manipulation, sensing, and industrial vision; and extend our programmable assembly station as a test-bed for generating and demonstrating those techniques. Five research tasks were concerned with two general problems: determining the location of parts, and moving a manipulator safely, without collisions. A sixth task was the extension of SRI's programmable assembly station. The tasks were: Analysis of LOcational Uncertainty; Acquisition and Analysis of Range Data; Characterization of Feature Detectors; Multiarm Collision Avoidance; Coordination of Multiple Manipulators; and Extension of a Programmable Assembly Station. GRA

N85-12615# SRI International Corp., Menlo Park, Calif. Artificial Intelligence Center.
KNOWLEDGE REPRESENTATION AND NATURAL-LANGUAGE SEMANTICS Annual Technical Report, 1 Jun. 1983 - 30 May 1984
R. C. Moore 13 Jul. 1984 10 p
(Contract F49620-82-K-0031)
(AD-A146025; AFOSR-84-0799TR; ATR-2) Avail: NTIS HC A02/MF A01 CSCL 05/7

Central to almost all aspects and applications of artificial intelligence is the representation and manipulation of large bodies of knowledge about the world. When viewed from the perspective of their ability to express facts about the external world, however, most knowledge representation schemes currently used in artificial intelligence are constrained by the limits of first-order logic. That is, they provide terms for referring to individuals, predicates for expressing properties and relations of individuals, and mechanisms that achieve some of the effects of propositional connectives and quantifiers. Much research effort has been expended on ways of organizing knowledge bases and developing information retrieval mechanisms; in terms of pure expressive power, however, existing representation systems are rather limited. This issue is brought into sharp focus when one seriously attempts to analyze the semantic content of expressions in natural language, since many types of linguistic expressions seem to require something beyond first-order logic to represent their meaning perspicuously. This project undertakes a program basic research in knowledge representation, focusing on the representation of concepts needed for the semantic analysis of natural language. The objectives of the project are to produce formalisms, suitable for manipulation by computer, for the representation of specific concepts that are important for natural-language semantics, and to give an independent account of the meaning of such representations using the tools of formal logic. Author (GRA)

N85-12616# Oxford Univ. (England). Dept of Engineering Science.
ON THE RELATIONSHIP BETWEEN LEHTOMAKI'S ROBUSTNESS TEST AND AN INVERSE NYQUIST BASED TEST
I. Postlethwaite, M. S. Tombs, Y. K. Foo, and A. P. Loh 1984 12 p refs Sponsored by United Kingdom Science and Engineering

Research Council and RAE
(OUEL-1526/84) Avail: NTIS HC A02/MF A01

The Lehtomaki robustness test and the inverse Nyquist based test of Postlethwaite and Foo are compared. Although the inequality in each test is the same, the conditions under which each is applicable are different. The inverse Nyquist based test can be used, providing the plant and perturbed plant models share the same number of closed right-half plane (CRHP) zero. It is shown that Lehtomaki's conditions are satisfied if the plant and perturbed plant models have the same numbers of poles and zeros in the CRHP. Lehtomaki's test is therefore a special case of the inverse Nyquist based test. Author (ESA)

N85-12197# Joint Publications Research Service, Arlington, Va.
TECHNOLOGICAL INSTITUTE DIRECTOR VIEWS ARTIFICIAL INTELLIGENCE
In its East Europe Rept.: Sci. Affairs, No. 791 (JPRS-84624) 26 Oct. 1983 p 12-17 Transl. into ENGLISH from Prace (Prague), 16 Jul. 1983 p 4 (For primary document see N85-12195 03-31)
Avail: NTIS HC A07/MF A01

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N85-12617*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A PSEUDOSPECTRAL LEGENDRE METHOD FOR HYPERBOLIC EQUATIONS WITH AN IMPROVED STABILITY CONDITION
Hillel Tal-Ezer (Tel-Aviv Univ.) Sep. 1984 48 p refs
(Contract NAS1-17070)
(NASA-CR-172475; ICASE-84-48; NAS 1.26:172475) Avail: NTIS HC A03/MF A01 CSCL 12A

A new pseudospectral method is introduced for solving hyperbolic partial differential equations. This method uses different grid points than previously used pseudospectral methods: in fact the grid are related to the zeroes of the Legendre polynomials. The main advantage of this method is that the allowable time step is proportional to the inverse of the number of grid points 1/N rather than to 1/n(2) (as in the case of other pseudospectral methods applied to mixed initial boundary value problems). A highly accurate time discretization suitable for these spectral methods is discussed. Author

N85-12618# Admiralty Marine Technology Establishment, Teddington (England).
ON MAXIMUM ENTROPY SIGNAL ANALYSIS
L. V. Embling Jun. 1983 28 p refs
(AD-A144374; AMTE(N)-TM-83057M; BR92413) Avail: NTIS HC A03/MF A01 CSCL 12/1

The maximum entropy signal analysis (MESA) method for deriving the auto spectrum from a discrete number of time series data was compared with the Fast Fourier Transform. The MESA was implemented on computer controlled spectrum analysis systems, and simple spectra were examined. It is concluded that MESA offers no advantages when large data records are available, since the quality of the spectra is poor and long computation times are required. Furthermore, the method produces highly variable absolute levels. However, if only short data records are available, then, provided a suitable sampling frequency is chosen, MESA is a reasonable means of producing the power spectrum. Author (ESA)

N85-12619# Naval Postgraduate School, Monterey, Calif.
A DECOMPOSABLE ALGORITHM FOR CONTOUR SURFACE DISPLAY GENERATION
M. J. Zyda Aug. 1984 18 p
(DA Proj. RR0-0001)
(AD-A145783; NPS52-84-011) Avail: NTIS HC A02/MF A01 CSCL 12/1

This paper is a study of a highly decomposable algorithm useful for the parallel generation of a contour surface display. The core component of this algorithm is a two-dimensional contouring algorithm that operates on a single, 2 x 2 subgrid of a larger grid. A model for the operations used to generate the contour lines for a single subgrid is developed. The inadequacies of the currently published algorithms, with respect to contour line generation for a subgrid, are pointed out in a brief review of the available literature. A data structure, the contouring tree, is introduced as the basis of a new algorithm for generating the contour lines for the subgrid. The construction of the contouring tree, and the completeness of an algorithm based upon the contouring tree, within the constraints of the contouring model are shown. GRA

N85-12620# Carnegie-Mellon Univ., Pittsburgh, Pa. Management Sciences Research Group.
STATISTICAL ANALYSIS OF SOME TRAVELING SALESMAN ALGORITHMS
E. Balas, T. W. McGuire, and P. Toth Jun. 1984 33 p
(Contract N00014-82-K-0329; Grant NSF ECS-82-05425)
(AD-A145786; MSRR-501) Avail: NTIS HC A03/MF A01 CSCL 12/1

This paper reports the results of a statistical analysis of the performance of three branch and bound algorithms for the general (asymmetric) traveling salesman problem on randomly generated test problems with up to 325 cities. Three types of functions, polynomial, superpolynomial (long-exponential) and exponential, were fitted to the performance data of each of the algorithms by least squares techniques. The three functions describe almost equally well the behavior of the algorithms in the range of problem sizes examined. GRA

N85-12621# Yale Univ., New Haven, Conn. Dept. of Computer Science.
CONVERGENCE OF SIP (STRONGLY IMPLICIT PROCEDURE)
P. Chen May 1984 12 p
(Contract N00014-82-K-0184)
(AD-A145810; YALEU/DCS/RR-321) Avail: NTIS HC A02/MF A01 CSCL 12/1

The convergence of the Strongly Implicit Procedure for solving self-adjoint elliptic difference equations is proved. B.G.

N85-12622# Yale Univ., New Haven, Conn. Dept. of Computer Science.
DIFFERENCE SCHEMES FOR EQUATIONS OF SCHRODINGER TYPE
T. F. Chan and L. J. Shen Jun. 1984 28 p
(Contracts N00014-82-K-0184; DE-AC02-81ER-10996)
(AD-A145812; YALEU/DCS/RR-320) Avail: NTIS HC A03/MF A01 CSCL 12/1

A collection of difference schemes for the numerical solution of an equation of the Schroedinger type was introduced and analyzed. This includes explicit and implicit schemes, 2-level and 3-level schemes and real and complex schemes. Many of these are analogous to classical schemes for the heat equation and the wave equation but some schemes are unique to the Schroedinger equation. Von Neumann type stability results are given for all the schemes and extensions to higher dimensions are derived in most cases. Many of stability results are quite different from the corresponding results for the heat equation and the wave equation. GRA

N85-12623# Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Mathematical Sciences.
NON-LINEAR SYSTEMS IN INFINITE DIMENSIONAL STATE SPACES Interim Technical Progress Report, 15 Jun. 1983 - 14 Jun. 1984
M. Slemrod Aug. 1984 4 p
(Grant AF-AFOSR-0172-81)
(AD-A145828; AFOSR-84-0818TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

The research in this effort has been directed into two main research areas - nonlinear distributed parameter control systems,

and nonlinear continuum dynamics with an emphasis on phase transitions. In the first year, the investigator has formulated a theory of feedback stabilization of a one dimensional string using non-local pseudo-punctual magnetic controls. In the second area, work has centered on materials exhibiting first order phase transitions. This should provide a unified theory of dynamic phase transitions and their numerical computation. Ten papers were prepared for presentation or publication during this period. Author (GRA)

N85-12624# University of Southern California, Los Angeles. Dept. of Electrical Engineering.
RETURN DIFFERENCE FEEDBACK DESIGN FOR ROBUST UNCERTAINTY TOLERANCE IN STOCHASTIC MULTIVARIABLE CONTROL SYSTEMS Final Report, 1 Oct. 1982 - 29 Sep. 1984
M. G. Safonov Jul. 1984 22 p
(Grant AF-AFOSR-0013-80)
(AD-A145861; AFOSR-84-0802TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

The objective of the research has been to develop engineering methodologies applicable, but not limited, to aerospace automatic control design problems in which there are performance specifications requiring precise control of system behavior in the presence of stochastic disturbances (e.g., wind gusts) and large-but-bounded uncertainties in the dynamical response of the system (e.g., parameter uncertainty, unmodeled nonlinearities, and so forth). During the past three years of research, a cohesive body of theory has been developed that enables engineers to relate the ability of feedback control systems to meet such specifications directly and quantitatively to the return difference matrix associated with the system's feedback loops. Now results enabling the infinity optimization of returned difference singular value Bode plots promise to be of great value in robust multivariable feedback controller synthesis. Continuing research is currently being aimed at further tightening the links between this theory and the most recent developments of modern stochastic linear optimal control synthesis theory, and extending the results to admit more practical problems so, that this theory may be used more effectively by engineers to efficiently and systematically design the feedback gains that determine a feedback system's return difference matrix. Such results substantially reduce the dependence of control engineers on intuition, simulation, and luck and provide the know-how to successfully and efficiently solve the increasingly complex and demanding aerospace control problems of the coming decades. Author (GRA)

N85-12625# Naval Postgraduate School, Monterey, Calif.
EVALUATING A(T) *D*A FOR SPARSE MATRICES: ANALYSIS Technical Report, May 1983 - Jun. 1984
Amnon Gonen Jun. 1984 27 p
(RR0-0001)
(AD-A145916; NPS53-84-0006) Avail: NTIS HC A03/MF A01 CSCL 12/1

The evaluation of the matrix product A(T) *A or A(T) *D*A, where A is an mxn real matrix and D an mxm diagonal matrix, is a fundamental operation for many algorithms. We analyze the evaluation of A(T) *A for several configurations of sparse matrices A all of which have the same sparsity. The complexity of the evaluation is estimated, and application to certain problems of optimization are given. Author (GRA)

N85-12626# Washington Univ., Seattle.
LEAST SQUARES ESTIMATION OF CONDITIONALLY HETEROSCEDASTIC AUTOREGRESSIONS Technical Report, 1 Jan. 1982 - 30 Nov. 1983
A. F. L. Nemec May 1984 21 p
(Contracts N00014-84-C-0169; N00014-82-K-0062)
(AD-A145994; TR-48) Avail: NTIS HC A02/MF A01 CSCL 12/1

The least squares estimate of the autoregressive parameter of a conditionally heteroscedastic autoregression is consistent and asymptotically normal. Failure to recognize conditional heteroscedasticity results in the underestimation of the variance of the least squares estimate, and in extreme cases, this effect can be substantial. The least squares estimate is not asymptotically distribution free, rather, the asymptotic distribution depends on the form of the conditional heteroscedasticity. Author (GRA)

N85-12627# Aeronautical Research Labs., Melbourne (Australia).
A COMPARATIVE STUDY OF THE FINITE ELEMENT AND BOUNDARY ELEMENT METHODS AS APPLIED TO A BOUNDARY VALUE PROBLEM OF A HARMONIC FUNCTION
T. Tran-Cong Apr. 1984 21 p
(AD-A146018; ARL-AERO-TM-363) Avail: NTIS HC A02/MF A01 CSCL 12/1

The Finite Element and Boundary Element Methods are described with their essential features illustrated using an example of a boundary value problem for a harmonic function. Analysis of the methodical errors is then carried out. This is followed by a consideration of the relative computational advantages of the two methods. GRA

N85-12628# Lincoln Lab., Mass. Inst. of Tech., Lexington.
THE ML (MAXIMUM LIKELIHOOD) METHOD FOR FREQUENCY ESTIMATION OF REAL SINUSOIDS IN NOISE
M. J. Tsai 27 Jul. 1984 22 p
(Contract F19628-80-C-0002)
(AD-A146053; TR-689; ESD-TR-84-026) Avail: NTIS HC A02/MF A01 CSCL 12/1

The DFT-based maximum likelihood method for frequency estimation of complex sinusoids as proposed in two previous articles is extended to treat the case of real data. Improvements on estimation precision and computation efficiency are obtained by imposing an equal-frequency constraint on the pair of complex sinusoids which corresponds to a real sinusoid and by utilizing a single-step interpolation in conjunction with a coarse finite search over the DFT data for the maximum of the likelihood function. Simulation results demonstrate these improvements. Author (GRA)

N85-12629# Ballistic Research Labs., Aberdeen Proving Ground, Md.
AN INTRODUCTION TO FUZZY REGRESSION ANALYSIS WITH A BALLISTIC APPLICATION
W. E. Baker Aug. 1984 24 p
(DA Proj. 1L1-61102-AH-43)
(AD-A146093; AD-F300476; ARBRL-TR-02575) Avail: NTIS HC A02/MF A01 CSCL 19/4

Regression models are frequently used for predicting, but quite often the value assumed by the independent variable is somewhat vague. That problem is overcome in this paper by utilizing a combination of fuzzy set methodology and conventional statistical techniques; specifically, fuzzy regression analysis. Fuzzy regression analysis is applied to a particular vulnerability problem, and the difference between this approach and one which utilizes only probability theory is briefly examined. GRA

N85-12630# Massachusetts Inst. of Tech., Cambridge.
FILTERING AND PREDICTION PERFORMANCE FOR A CLASS OF SYSTEMS WITH UNCERTAIN PARAMETERS Technical Report
C. B. Chang and K. P. Dunn 27 Jul. 1984 24 p
(Contract F19628-80-C-0002)
(AD-A146145; TR-694; ESD-TR-84-032) Avail: NTIS HC A02/MF A01 CSCL 12/1

A covariance analysis technique using the Cramer-Rao lower bound for assessing filtering and prediction performance for a class of nonlinear systems is presented. The class of systems considered is nonlinear, deterministic, with unknown parameters. The validity of this technique for the problems considered is justified using local observability theory and unbiased estimation for nonlinear systems. Author (GRA)

N85-12631# Utah Univ., Salt Lake City.
SINC METHOD OF SOLUTION OF SINGULAR INTEGRAL EQUATIONS Technical Report
F. Stenger and D. Elliott 1984 10 p

(Contract DAAG29-83-K-0012)
(AD-A146155; ARO-19297.8-MA) Avail: NTIS HC A02/MF A01 CSCL 12/1

The use of the Whittaker cardinal (or sinc) function for the approximate solution of the complete, one-dimensional, singular integral equation with arbitrary index is discussed. This document is mainly concerned with the case when the equation is taken over the arc (-1,1). An indirect method of approximate solution, based on the equivalent Fredholm integral equation, is described. Convergence of the approximate solutions is discussed in some detail and it is shown that the error decays exponentially.
Author (GRA)

N85-12632# Purdue Univ., Lafayette, Ind. Dept. of Statistics.
LOCALLY OPTIMAL SUBSET SELECTION RULES BASED ON RANKS UNDER JOINT TYPE 2 CENSORING
S. S. Gupta and T. C. Liang Sep. 1984 26 p
(Contract N00014-84-C-0167)
(AD-A146179; TR-84-33) Avail: NTIS HC A03/MF A01 CSCL 12/1

This paper deals with the derivation of subset selection rules which satisfy the basic P-condition and which locally maximize the probability of a correct selection among all invariant subset selection rules based on the ranks under the joint type II censoring. Following the earlier setup of Gupta, Huang and Nagel (1979), a locally optimal subset selection rule R1 is derived. The property of local monotonicity related to the rule R1 is discussed. GRA

N85-12633# Texas A&M Univ., College Station. Dept. of Mathematics.
NONLINEAR REGRESSION WITH EMPHASIS ON SPLINE METHODS Final Report, 1 Jul. 1975 - 30 Jun. 1984
C. K. Chui, P. W. Smith, and J. D. Ward 2 Aug. 1984 22 p
(Contract DAAG29-81-K-0133; Grant DAAG29-78-G-0097)
(AD-A146192; ARO-13069.12-MA; ARO-15596.15-MA; ARO-18204.17-MA) Avail: NTIS HC A02/MF A01 CSCL 12/1

Spline functions with variable knots have been very useful in nonlinear regression and approximation. For example, shape-preserved curve fitting can be adjusted to give optimal degree of approximation, and uniqueness, computational methods, etc. have also been studied. To further investigate the local behavior of best approximants, the idea of best local approximation was introduced. This relates the original problem to three important areas of research, namely: Pade approximants, recursive digital filter realization, and certain minimax approximation problems. In order to give meaningful investigation into these areas, techniques from Functional Analysis and Operator Theory have been used, and related but quite general results on Approximation Theory have also been found. In studying multi-variable regression, it was noted that tensor-product splines have very limited applications. Hence, basic theory and results concerning dimensions, bases, B-splines, interpolation, etc. on bivariate, and sometimes multivariate, non-tensor product splines have been obtained. Author (GRA)

N85-12634# Texas Univ., Austin. Center for Cybernetic Studies.
A TWO-SEGMENT APPROXIMATION ALGORITHM FOR SEPARABLE CONVEX PROGRAMMING WITH LINEAR CONSTRAINTS
I. Ali, A. Charnes, and T. Song Jan. 1984 26 p
(Contracts N00014-81-C-0236; N00014-82-K-0295; MDA903-83-K-0312)
(AD-A146215; CCS-RR-476) Avail: NTIS HC A03/MF A01 CSCL 12/1

Document discusses a new algorithm for the separable convex programming with linear constraints. This is based on the approximation of the objective function by at most two linear pieces in the neighborhood of the current feasible solution. The two segments will be adaptively defined rather than predecided fixed grids. If, furthermore, the objective function is differentiable, and one introduces a non-Archimedean infinitesimal, the algorithm generates a sequence of feasible solutions every cluster point of which is an optimal solution. Computational tests on the problem with up to 196 non-linear variables is presented. Author (GRA)

N85-12635# Howard Univ., Washington, D. C. Dept. of Mathematics.
APPLICATION OF SUMMABILITY METHODS TO JACKSON THEOREMS FOR SPLINES Final Report, 1 Jan. 1983 - 30 Jun. 1984
L. A. Raphael 30 Jun. 1984 11 p
(Grant DAAG29-83-G-0002)
(AD-A146256; ARO-20486.4-MA) Avail: NTIS HC A02/MF A01 CSCL 12/1

This project involved research in four mathematical areas: (1) Best local approximation in several variables for single and multi-point data sets. Hermite interpolation schemes are a special case of these schemes; (2) Analytic summability theory of eigenfunction expansions associated with singular Sturm-Liouville systems; and equisummability of eigenfunction expansions associated with elliptic operators of the same order with leading terms positive; (3) Jackson-type theorem for best one-sided approximation by one-dimensional splines; and (4) Inclusion theorems for absolute summability of divergent integrals. Author (GRA)

N85-12636# Wisconsin Univ., Madison. Mathematics Research Center.
THE LINDSTROM-MADDEN METHOD FOR SERIES SYSTEMS WITH REPEATED COMPONENTS Summary Report
A. P. Soms Aug. 1984 16 p
(Contracts DAAG29-80-C-0041; N00014-79-C-0321)
(AD-A146265; MRC-TSR-2732) Avail: NTIS HC A02/MF A01 CSCL 12/1

Series systems with repeated components arise often in engineering and physics. It is therefore important to utilize data obtained on individual components in an efficient manner when assessing the reliability of the combined system. This paper gives one method for doing so. The Lindstrom-Madden method of computing lower confidence limits for series systems with unlike components is extended to series systems with repeated components utilizing the results of Harris and Soms (1983). An exact solution is given for no failures and key test results, together with an approximation for the general case. Numerical examples are also provided. GRA

N85-12637# Science Applications, Inc., Pleasanton, Calif.
MOVING FINITE ELEMENTS IN 2-D Final Report, 8 Jun. 1983 - 7 Jun. 1984
R. J. Gelinas 6 Aug. 1984 173 p
(Contract F49620-81-C-0073)
(AD-A146266; SAI-84/1299; AFOSR-84-0832TR) Avail: NTIS HC A08/MF A01 CSCL 12/1

The moving finite element (MFE) method is a new approach for numerically solving partial differential equation (PDE) systems; it is particularly well suited for resolving PDE solutions which may contain large, multiple gradients over highly disparate scales in both space and time. These types of PDE's abound in such basic technical disciplines as aerodynamics (with emphasis on shear layers, shocks and their possible interactions), combustion, plasma physics, material interface phenomena, continuum mechanics, and other transport processes. GRA

N85-12638# Pittsburgh Univ., Pa. Inst. for Computational Mathematics and Applications.
VERIFICATION OF A CLASS OF DEADLOCK-FREE, SELF-TIMED, COMPUTATIONAL ARRAYS
R. G. Melhem Aug. 1984 50 p
(Contract N00014-80-C-0455)
(AD-A146272; ICMA-84-76) Avail: NTIS HC A03/MF A01 CSCL 12/1

A special class of self-timed networks is defined and two steps are suggested for the verification of any computation performed on networks in this class. First, a proof that the network is deadlock-free, and second, a verification of the results of the computation. In relation to the first step, an algebra of events is developed and used to prove that the liveness of any self-timed network is determined uniquely by its initial state. Moreover, a method is presented for the verification of liveness in networks

preset to given initial states. In order to verify the results of deadlock-free self-timed computations, general VLSI cellular networks are defined to include both systolic and self-timed computational arrays. A model for the verification of computations on these networks is then obtained by the generalization of a previous model that was suggested for systolic computations.
Author (GRA)

N85-12639# Florida Univ., Gainesville. Dept. of Industrial and Systems Engineering.
DESIGNING OPTIMAL AOQL SAMPLING PLANS A COMPUTERIZED APPROACH
J. E. Walker and R. S. Leavenworth Jan. 1984 48 p
(Contract N00014-83-K-0093)
(AD-A146288; RR-84-1) Avail: NTIS HC A03/MF A01 CSCL 12/1

This study provides an algorithm and computer program, coded in FORTRAN IV, to develop double sampling acceptance plans for attributes which satisfy a specified Average Outgoing Quality Limit (AOQL) and minimize the Average Fraction Inspected at a specified quality level, P sub 1. An analysis of the steps in the algorithm is provided and comparison is made among the results of program runs and Dodge-Romig AOQL and MIL-STD-105D plans.
GRA

N85-12640# Clarkson Coll. of Technology, Potsdam, N.Y. Dept. of Electrical and Computer Engineering.
EXTINCTION BY DIELECTRIC PARTICLES AT OPTICAL AND INFRARED WAVELENGTHS Final Report, 1 Dec. 1982 - 31 May 1984
P. W. Barber 30 Jul. 1984 3 p
(Contract DAAG29-83-K-0011)
(AD-A146305; ARO-20121.2-GS) Avail: NTIS HC A02/MF A01 CSCL 12/1

Calculations for metal prolate spheroidal particles show that enhanced fields can occur even when the particles are a significant fraction of a wavelength in size. Analysis of the information content of the Mueller Matrix has shown that signal processing techniques can be used to extract the particle volume and axial ratio from the polarized angular scattering. The exact scattering solution for coupled parallel fibers has permitted an investigation of the onset of multiple scattering as a function of fiber spacing. Calculations for a size/shape spheroidal distribution of soil particles are shown to fit measured results better than a simple spherical distribution.
Author (GRA)

N85-12641# Technische Hochschule, Darmstadt (West Germany). Fachbereich Mathematik.
ON EXPLICIT DIFFERENCE SCHEMES FOR HYPERBOLIC SYSTEMS WITH VARIABLE COEFFICIENT 2 [WEBER EXPLIZITE DIFFERENZENVERFAHREN FUER HYPERBOLISCH SYSTEME MIT VARIABLEN KOEFFIZIENTEN 2]
Karl Graf Finck vonFinckenstein Mar. 1984 13 p refs In GERMAN Submitted for publication
(Preprint-808) Avail: NTIS HC A02/MF A01

The introduction of a modified stability condition is used to show that the Lax-Wendroff method converges for irregular hyperbolic systems with variable coefficients. The proof does not use local amplification matrices. The stability is directly proved by estimation of the powers of the discretized matrices. Author (ESA)

N85-12642# Oxford Univ. (England). Dept. of Engineering Science.
REMOVAL OF SINGULARITIES IN TRESCA AND MOHR-COULOMB YIELD FUNCTIONS
S. W. Sloan and J. R. Booker 1984 20 p refs Sponsored by Australian Research Grants Scheme
(OUEL-1528/84; SM05O/84) Avail: NTIS HC A02/MF A01

A modified yield function to round-off the vertices in the Tresca and Mohr-Coulomb yield functions is derived. The fitting procedure enforces continuity of slope between the modified yield function and the original yield functions, thus ensuring that the overall yield function is differentiable for all stress values. The modified yield function is used in the vicinity of the vertices and is given in a form suitable for finite element programming. The Tresca and Mohr-Coulomb yield functions can be approximated as closely as desired by adjusting one parameter.
Author (ESA)

N85-12643# Technische Hochschule, Darmstadt (West Germany). Fachbereich Mathematik.
AN INTEGRAL EQUATION FORMULATION FOR A BOUNDARY VALUE PROBLEM OF ELASTICITY IN THE DOMAIN EXTERIOR TO AN ARC
George C. Hsiao (Delaware Univ., Newark), Ernst P. Stephan (Georgia Inst. of Tech., Atlanta), and Wolfgang L. Wendland Jul. 1984 14 p refs Submitted for publication Sponsored by Alexander von Humboldt-Stiftung, West Germany
(Preprint-833) Avail: NTIS HC A02/MF A01

A Dirichlet problem for the two-dimensional linear elasticity equation in the domain exterior to an open arc in the plane is considered. It is shown that the problem can be reduced to a system of boundary integral equations with the unknown density function being the jump of stresses across the arc. Existence, uniqueness, and regularity results for the solution to the boundary integral equations are established in Sobolev spaces. Asymptotic expansions concerning the singular behavior for the solution near the tips of the arc are obtained. By adding special singular elements to the regular splines as test and trial functions, an augmented Galerkin procedure is used for the corresponding boundary integral equations to obtain a quasi-optimal rate of convergence for the approximate solutions.
Author (ESA)

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N85-12644# Educational Testing Service, Princeton, N. J.
MAXIMUM LIKELIHOOD AND BAYESIAN PARAMETER ESTIMATION IN ITEM RESPONSE THEORY
F. M. Lord Aug. 1984 24 p
(Contract N00014-83-C-0457)
(AD-A145775; ETS-RR-84-30-ONR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Advantages and disadvantages of joint maximum likelihood, marginal maximum likelihood, and Bayesian methods of parameter estimation in item response theory are discussed and compared. Author supplied keywords include: Mental Test Theory and Bias (Statistical).
GRA

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N85-12645# Texas Univ., Austin. Austin Center for Cybernetic Studies.
HOMOMONOTONE GAMES AND MONOCORE SOLUTIONS, REVISED
A. Charnes, S. Duffuaa, and B. Golany Aug. 1984 21 p
(Contract N00014-82-K-0295)
(AD-A146213; CCS-RR-471-Rev) Avail: NTIS HC A02/MF A01 CSCL 12/1

A new solution concept, the Monocore, for superadditive n-person cooperative games is introduced. Based on the notion of strong-superadditivity or homomonotonicity, it transforms any superadditive game into a non-empty core game and then finds a unique imputation in the core of the transformed game. The Monocore is applied to games in characteristic function from and in homomollifier form and a way of comparison is suggested. A general class of Monocore solutions is described and related to some aspects of Information Theory.
Author (GRA)

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N85-12646 Suomalainen Tiedeakatemia, Helsinki (Finland).
ON THE THEORY OF COERCITIVE LINEAR PARTIAL DIFFERENTIAL OPERATORS Ph.D. Thesis [ZUR THEORIE DER KOERZITIVEN LINEAREN PARTIELLEN DIFFERENTIALOPERATOREN]
Jouko Tervo 1984 53 p refs In FINNISH
(ISSN-0355-0087; ISBN-951-41-0467-6) Copyright. Avail: Issuing Activity

The background and principles of the theory of coercitive linear partial differential operators are discussed. Maximal and minimal operators, ealization of pairs, periodic losses, the regularity of generalized losses, and characterization of coercitivity with the aid of the regularity of generalized losses are considered.
Transl. by B.G.

N85-12647 Technische Univ., Munich (West Germany). Inst. fuer Mathematik.
ORTHOGONAL POLYNOMIALS AND RIGGED HILBERT SPACE
D. P. L. Castrigiano Sep. 1983 14 p refs
(TUM-M8313) Copyright. Avail: Issuing Activity

A duality correspondence is set up between polynomials satisfying a recurrence relation and the generalized eigenvectors of a Jacobi operator in a rigged Hilbert space. In the case of a symmetric recurrence, a ready consequence of that correspondence is an alternative proof of Favard's theorem.
Author (ESA)

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N85-12648*# National Aeronautics and Space Administration, Washington, D. C.
GAS PRESSURE AND ELECTRON DENSITY AT THE LEVEL OF THE ACTIVE ZONE OF HOLLOW CATHODE ARC DISCHARGES
M. Habibollah Minoo Jun. 1984 10 p refs Transl. into ENGLISH from Compt. Rend., Ser., B., Sci. Phys. (Paris), v. 272, no. 5, 1 Feb. 1971 p 314-317 Original language document was announced as A71-23843 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-77477; NAS 1.15:77477) Avail: NTIS HC A02/MF A01 CSCL 20H

A model for the longitudinal variations of the partial pressures of electrons, ions, and neutral particles is proposed as a result of an experimental study of pressure variations at the level of the active zone as a function of the various discharge parameters of a hollow cathode arc. The cathode region where the temperature passes through its maximum is called active zone. The proposed model embodies the very important variations which the partial electron and neutral particles pressures undergo at the level of the active zone.
Author

N85-12649# Army Electronics Research and Development Command, Fort Belvoir, Va. Night Vision and Electro-Optics Lab.
EFFECT OF AN UNDERLAYER OF CADMIUM TELLURIDE ON THE REFLECTION-REDUCING PROPERTIES OF ZINC SULFIDE ON MERCURY CADMIUM TELLURIDE Technical Report, Jan. - Mar. 1983
J. T. Cox Apr. 1984 24 p
(DA Proj. 1P6-23710-RQD-3)
(AD-A146195; DELNV-TR-0041) Avail: NTIS HC A02/MF A01 CSCL 20/3

For many years ZnS has been used as a passivating coating for HgCdTe photoconductive infrared reflectors. It has served the dual purpose of passivating the surface and acting as an antireflection coating. A recent suggestion in the research Division, NVEOL, was to use a layer of CdTe as the first layer on the HgCdTe surface. It was hoped that better passivation might result because of the properties of CdTe. A final layer ZnS would then be added to achieve further environmental protection and low reflectance. The purpose of this report is to investigate, by computational means, the effect of the underlying layer of CdTe on the reflectance-reducing properties of ZnS. This will be done with absorption coefficient of HgCdTe as a parameter to simulate the effect of cooling the detector to 77 K.
GRA

N85-12650# California Univ., Los Angeles.
ANALYSIS OF PIEZOELECTRIC DISKS AND CYLINDERS USING FINITE ELEMENT METHOD Technical Report
M. Ohtsu and K. Ono Sep. 1984 10 p
(Contract DAAG29-81-K-0116)
(AD-A146323; ARO-18220.7-MS) Avail: NTIS HC A02/MF A01 CSCL 20/3

Resonance characteristics of piezoelectric transducer elements were analyzed using the finite element method (FEM). We developed a computer program based on the axisymmetrical element formulation. Using this program, we determined resonance frequencies and vibration modes of cylindrical and disk-shaped elements of BaTiO3, PZT-4 and PZT-5A ceramics. The resonance frequencies were obtained by the FEM analyses for the stress-free boundary condition. Resonance vibration modes were also determined and found to be quite complex.
GRA

N85-12651# Kernforschungsanlage, Juelich (West Germany). Inst. fuer Festkoerperforschung.
EXOTHERMIC PROCESSES IN SOLIDS UNDER LOW TEMPERATURES, THEIR PHYSICS AND THEIR CRYOGENIC IMPLICATIONS Thesis - Cologne Univ. [EXOTHERME PROZESSE IN FESTKOERPERN BEI TIEFEN TEMPERATUREN, IHRE PHYSIK UND IHRE KRYOTECHNISCHEN IMPLIKATION]
M. Schwark May 1984 62 p refs In GERMAN
(JUEL-1919; D-38; ISSN-0366-0885) Avail: NTIS HC A04/MF A01

Heat output of materials used for cryogenic equipment was studied at temperatures of 30 to 60 mK. Hydrogen in copper shows orthoparaconversion, releasing an equivalent of 0.1 nW/gr copper within 10 hr of sample cooling. For plastics (Stycast 2850) values are up to 0.2 nW/gr. In quartz, NbTixDy and NbTixHy ($x > y$) tunnel processes occur up to 100 hr after cooling. The theory of Anderson, Halperin and Varma is applicable in longer periods. Plastics as well as hydrogen in copper parts are serious sources for thermal leaks.
Author (ESA)

N85-12701# Technische Univ., Berlin (West Germany).
METAMAGNETIC SYSTEMS [METAMAGNETISCHE SYSTEME]
A. Axmann, H. Dachs, K. Kakurai, F.-J. Kasper, J. K. Kjems (Riso National Lab., Roskilde, Denmark), W. Knop, A. H. Millhouse, and M. Steiner *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 100-111 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

N85-12706# Technische Univ., Munich (West Germany).
NEUTRON SCATTERING ON MAGNETIC STRUCTURES AND AT MAGNETIC PHASE TRANSITIONS [NEUTRONENSTREUUNG AN MAGNETISCHEN STRUKTUREN UND BEI MAGNETISCHEN PHASENUEBERGAENGEN]
R. Anders, T. Faisst, W. vonHoersten, P. Kournettas, E. Roeber, K. Stierstadt, E. Steichele, J. Schelten, and D. Schwahn *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 156-165 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

N85-12707# Mainz Univ. (West Germany).
MAGNETISM OF THE RARE EARTH COMPOUNDS [MAGNEISMUS DER SELTENEN-ERD-VERBINDUNGEN]
K. Knorr, A. Loidl, H. Wehr, R. Feile, F. Kenntner, and G. Dittel *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 166-174 refs In GERMAN
(For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution*.

N85-12652# Bonn Univ. (West Germany).
THE S-MATRIX AND ACOUSTIC SIGNAL STRUCTURE IN SIMPLE AND COMPOUND WAVEGUIDES
Calvin H. Wilcoxx Mar. 1983 38 p refs
(PP-583) Avail: NTIS HC A03/MF A01

Acoustic signal propagation in both simple and compound waveguides is analyzed by means of normal model expansions. For simple waveguides the normal modes are constructed explicity by separation of variables. For compound waveguides they are constructed by a perturbation method based on those for simple waveguides. The asymptotic wave functions for a waveguide are characterized by a sequence of functions that, physically, describe the momentum distributions of the modal waves. With each waveguide is associated a scattering operator, or S-matrix, that operates in the space of these momentum distributions. The significance of the S-matrix in the analysis of acoustic signal structure in waveguides is demonstrated. The momentum distribution of the signal generated in a compound waveguide by sources far from the resonator is simply the image under the S-matrix of the momentum distribution of the signal generated by the same sources in the corresponding simple waveguide. R.S.F.

N85-12653# National Research Council of Canada, Ottawa (Ontario).
TOTAL AREA OF DIFFUSION ELEMENTS IN A REVERBERATION CHAMBER AND MEASURED DEGREE OF SOUND ABSORPTION
W. Kuhl and H. Kuttruff 1984 14 p Transl. into ENGLISH from Acustica (West Germany), v. 54, no. 4, 1983 p 41-43
(NRC/CNR-TT-2110; ISSN-0077-5606) Avail: NTIS HC A02/MF A01

The measurement of sound absorption of materials in reverberation rooms was examined. The absorption coefficient was measured using diffusers randomly suspended in the reverberation room. Author

N85-12654*# National Aeronautics and Space Administration, Washington, D. C.
SHEAR-LAYER CORRECTION AFTER AMIET UNDER CONSIDERATION OF ADDITIONAL TEMPERATURE GRADIENT. WORKING DIAGRAMS FOR CORRECTION OF SIGNALS
W. Dobrzynski Jul. 1984 57 p refs Transl. into ENGLISH of the mono. "Scherschichtkorrektur nach Amiet unter Beruecksichtigung einer Zusaetzlichen Temperaturscherschicht. Arbeitsdiagramme fuer die Korrektur Akustischer Signale be Fernfeldmessungen in windkanaelen mit offenen Messtrecken" Brunswick, Mar. 1984 p 1-60 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-77741; NAS 1.15:77741) Avail: NTIS HC A04/MF A01 CSCL 20A

Amiet's correction scheme for sound wave transmission through shear-layers is extended to incorporate the additional effects of different temperatures in the flow-field in the surrounding medium at rest. Within a parameter-regime typical for acoustic measurements in wind tunnels amplitude- and angle-correction is calculated and plotted systematically to provide a data base for the test engineer. Author

N85-12655# Middleton (David), New York.
ACOUSTIC SCATTERING CROSS SECTIONS FOR TRULY COMPOSITE WIND-WAVE SURFACES. SCATTERING WITHOUT BUBBLES Technical Report, Feb. 1983 - Apr. 1984
D. Middleton 20 Aug. 1984 138 p
(Contracts N00140-83-M-NA11; N00140-83-C-KA23; DA Proj. F59-554)
(AD-A145672; NUSC-TD-7205) Avail: NTIS HC A07/MF A01 CSCL 20/1

Underwater acoustic scattering cross sections for truly composite windwave surfaces are obtained analytically, where the composite surface consists of the usual single gravity-capillary wave surface and an independent ripple structure which rides upon the former. The later consists of an ensemble of solitons, as hydraulic jumps, moving nondispersively in a very thin (moving) surface layer of the gravity-capillary waves. These soliton-ripples are postulated to provide a scattering mechanism of sufficient strength potentially to account for the often large observed discrepancies 0(10-20) db) in the (back)-scattering cross sections between conventional theory and experiment when high frequencies 0(> or = 10 kHZ) and small grazing angles 0(5-20 deg) are employed, without the assumption of near-surface bubble mechanisms. This is particularly important for the frequent situations when bubbles are demonstrably lacking, even at mean wind speeds up to 0(10 m/sec = 20 knots) and possibly higher. Here, the capillary component of the gravity-capillary wave continuum is not large enough by itself to provide sufficient Bragg scatter, while the soliton-ripples appear capable of so doing. Of course, if near-surface bubbles are verified to be present in sufficient numbers, they by themselves, or with the soliton-ripples, can account for the noticeably larger (back)scatter cross sections obtained experimentally. GRA

N85-12656# Army Construction Engineering Research Lab., Champaign, Ill.
PREDICTION AND MODELING OF HELICOPTER NOISE Final Report
R. Raspet, M. Kief, and R. Daniels Aug. 1984 54 p
(DA Proj. 4A1-62720-A-896)
(AD-A145764; CERL-TR-N-186) Avail: NTIS HC A04/MF A01 CSCL 20/2

Sound exposure level (SEL) data from three Army helicopters were used to test a proposed method for calculating sideline decay developed for fixed-wing aircraft. The Federal Aviation Administration (FAA) and the U.S. Air Force (USAF) have adopted this method for use with fixed-wing aircraft, and it was desired to know if the same method could predict rotary-wing aircraft sideline decay with distance or if a more complex computer model is necessary. The procedure was found accurate for limited altitudes and slant distances. In addition, the sideline decay data were studied using variables known to affect sound attenuation. The purpose was to gain further insight into the mechanisms of sideline decay with distance. Variations in the results suggest an unknown mechanism is contributing to this attenuation. Author (GRA)

N85-12657# Delaware Univ., Newark. Dept. of Mathematical Sciences.
THE DEVELOPMENT OF NEW METHODS FOR SOLVING THE TARGET IDENTIFICATION OR INVERSE SCATTERING PROBLEM FOR TIME-HARMONIC ACOUSTIC AND ELECTROMAGNETIC WAVES Final Report, 1 May 1981 - 31 Aug. 1984
D. L. Colton 18 Jul. 1984 5 p
(Grant AF-AFOSR-0103-81)
(AD-A145821; AFOSR-84-0798TR) Avail: NTIS HC A02/MF A01 CSCL 20/1

During this period, two topics were investigated. On the inverse scattering problem 1 book, 8 research papers and 7 survey papers were written. On the inverse Stefan problem 3 research papers and 1 survey paper were written. The papers on inverse scattering derive and numerically implement new, stable methods for solution,

obtain a variety of uniqueness theorems and investigate the class of far field patterns associated with the scattering of plane waves by a bounded obstacle. (The set of far field patterns is in general not dense in the space of square integrable functions defined on the unit sphere when the wave number is an eigenvalue of the interior problem. This suggests new methods of solution currently being investigated.) The papers on the inverse Stefan problem derive and numerically implement new methods for solution in two space variables, prove in a new way the strong maximum principle for the heat equation and obtain expansion theorems for analytic solutions for the heat equation. GRA

N85-12658# Catholic Univ. of America, Washington, D.C. Dept. of Physics.
SELECTIVE OBSERVATION OF ELASTIC-BODY RESONANCES VIA THEIR RINGING IN TRANSIENT ACOUSTIC SCATTERING Interim Report, 1 Oct. 1983 - 30 Sep. 1984
W. E. Howell, S. K. Numrich, and H. Ueberall 12 Sep. 1984 34 p
(Contract N00014-76-C-0430; RR0-11008)
(AD-A145868) Avail: NTIS HC A03/MF A01 CSCL 20/1

An elastic body immersed in a fluid will ring when isonified by sound whose frequency is the same as one of the resonances of that body. Correspondence has been established between these normal mode resonances of the body and the individual circumferential waves predicted by creeping wave theory. Isonifying the target by a relatively long sinusoidal wave train, with a narrow spectrum centered around, or away from, a selected resonance frequency, results in a series of superimposed responses consisting of the specular reflection and succession of creeping waves arriving after repeated circumnavigations of the body which, at resonance only, add in phase to generate the ringing response. Echoes from spherical targets are analyzed in this fashion, and are also associated with the resonance poles in the complex frequency plane, obtained by us in the form of contour plots. Author (GRA)

N85-12659# Royal Australian Navy Research Lab., Edgecliff.
SIMPLE PREDICTION OF CONVERGENCE ZONE PROPAGATION IN WATERS AROUND AUSTRALIA
M. W. Lawrence Sep. 1983 26 p
(AD-A145986; RANRL-TM(EXT)-9/83) Avail: NTIS HC A03/MF A01 CSCL 20/1

The horizontal ranges to convergence zones are determined for waters around Australia, using historical sound speed profile data and a computer model. A good correlation is found between sound speed at the surface and the convergence zone range, but with a different relationship between these parameters than observed in various Northern Hemisphere waters. The relationship between critical depth and surface sound speed for Australian waters is found to be similar to, although not identical with, that for the North Pacific Ocean. Author (GRA)

N85-12660# Naval Research Lab., Washington, D. C.
VERTICAL COHERENCE ALONG A MACRORAY PATH IN AN INHOMOGENEOUS ANISOTROPIC OCEAN Interim Report
J. S. Perkins, B. B. Adams, and J. J. McCoy 20 Aug. 1984 39 p
(DA Proj. RR0-1108)
(AD-A145992; NRL-8792) Avail: NTIS HC A03/MF A01 CSCL 12/1

This report is a major output of a program in spatial properties of low-frequency acoustic fields in the deep ocean. This project was instituted at the Naval Research Laboratory in 1974 to provide a priori estimates of the capabilities and limitations of large arrays which are due to coherence degradations from environmental causes. The research has emphasized stochastic measures of irregularities in the ocean. This approach has been followed to provide probabilistic predictions of the environmental limits to aperture designs. The elements degrading the spatial coherence of an acoustic signal have been dealt with in the following order: volume effects, bottom effects, and surface effects. Specifically, this report provides the background, theoretical basis, algorithm, and operational information for a FORTRAN computer program called COVERT. This program estimates the effect of stochastic volume scattering on the vertical spatial coherence of an acoustic signal along a single path. The propagation path (determined by the mean sound-speed field) is part of the program input and is termed a macroray path. The scattering employed is appropriate for internal waves; i.e., it is characterized by a high degree of anisotropy, is depth dependent, and is described by a fluctuations spectrum that is characteristic of internal waves. The report summarizes the theoretical formulations on which the program is based, the numerical algorithms used, the input data required, and the outputs that are calculated. Author (GRA)

N85-12661# Naval Underwater Systems Center, New London, Conn. New London Lab.
DETECTION, CLASSIFICATION, AND EXTRACTION OF HELICOPTER-RADIATED NOISE
R. F. Dwyer 25 Jul. 1984 14 p
(DA Proj. RR0-1405)
(AD-A145993; NUSC-TM-841134) Avail: NTIS HC A02/MF A01 CSCL 20/1

Surface ships operating in conjunction with supporting helicopters may experience sonar performance degradation due to the accompanying interference from helicopter-radiated noise. The interference manifests itself in the time domain as impulses due to blade vortex interactions and in the frequency domain as harmonic components from both the main and tail rotors. But these components are not pure sinusoids. In addition, they have non-Gaussian probability distributions. They appear to be caused by frequency modulation due to the rotating blades. The paper discusses detection and classification of helicopter-radiated noise from cumulative distribution function estimates, autocorrelation estimate, spectrum estimates, and from higher-order moment estimates. After the detection and classification problem is discussed a method to extract the interference by implementing a non-linearity in the frequency domain is presented. It is shown with real helicopter-radiated noise data that autocorrelation estimates can be improved by extracting the interfering components. The extracted components are also available as an enhanced time domain representation. Author (GRA)

N85-12662# Army Construction Engineering Research Lab., Champaign, Ill.
ROTARY-WING AIRCRAFT NOISE MEASUREMENTS: ANALYSIS OF VARIATIONS AND PROPOSED MEASUREMENT STANDARD Final Report
P. D. Schomer Sep. 1984 24 p
(AD-A146207; CERL-TR-N-184) Avail: NTIS HC A02/MF A01 CSCL 20/1

The Army Installation Compatible Use Zone (ICUZ) Program seeks to safeguard Army installation operational capability. As part of ICUZ, helicopter noise is assessed using a computerized model developed by the U.S. Air Force and modified by the U.S. Army Construction Engineering Research Laboratory (USA-CERL) for rotary-wing aircraft use. Helicopter source emissions data are required as input to this model. This report explores the statistical variations in helicopter source emissions characterization and recommends a draft measurement standard designed to minimize the effects of these variations. Author (GRA)

N85-12663# Mississippi Univ., University.
COUPLING OF AIRBORNE SOUND INTO THE EARTH Final Report, 8 Jun. 1981 - 7 Jan. 1984
H. E. Bass and L. N. Bolen 1 Aug. 1984 120 p
(Contract DAAG29-81-K-0078)
(AD-A146231; PARGUM-84-01; ARO-17560.2-GS) Avail: NTIS HC A06/MF A01 CSCL 17/1

As an acoustic wave propagates above the surface of the Earth, part of the energy is transferred from motion of air to motion of the Earth's surface which can be detected by a geophone. The purpose of the study described here was to establish the physical mechanisms responsible for this acoustic to seismic transfer of energy, to develop a mathematical formulation for quantitative predictions of the acoustic/seismic transfer function, and to collect for comparison to the physical model. The physical

model chosen to describe coupling of energy into the Earth was developed by Biot and later extended by Stoll primarily for describing sound propagation in ocean sediments. The Biot-Stoll model describes sound propagation in a medium composed of fluid saturated pores and an elastic frame (matrix). The differential equations which arise from this formalism allow for a fast wave which propagates, primarily, in the frame and a slow wave which propagates, primarily in the fluid. For our application we assume that the fluid is air and that the porous material is a layer between the air (an upper semi-infinite half space) and homogenous clay (a lower semi-infinite half space). Calculations suggest that the predicted transfer functions are not strongly affected by the flow resistance of the porous layer, the elastic properties of the clay, and the thickness of the porous layer. These three quantities were independently measured. GRA

N85-12664# California Univ., Los Angeles. Dept. of Materials Science and Engineering.
ACOUSTIC EMISSION WAVEFORMS IN A HALF SPACE
M. Ohtsu and K. Ono Sep. 1984 9 p
(Contract DAAG29-81-K-0116)
(AD-A146322; ARO-18220.6-MS) Avail: NTIS HC A02/MF A01 CSCL 12/1

A generalized theory of acoustic emission (AE) is developed on the basis of the theory of elastodynamics and dislocation models. Acoustic emission sources are represented as dislocation sources and include both discontinuities of displacement components and tractions. As AE waves are observed at a stress free surface, Green's functions in a half space are obtained. FORTRAN programs for computing these functions for non-Cauchy solids are used to calculate AE waveforms from a point crack and moving cracks. Their implication on current attempts of determining source characteristics via deconvolution is discussed.
Author (GRA)

N85-12665# Rolls-Royce Ltd., Derby (England).
COMMERCIAL AIRCRAFT NOISE
M. J. T. Smith 1 Aug. 1984 9 p refs
(PNR-90206) Avail: NTIS HC A02/MF A01

The state of the art in aircraft noise reduction is reviewed. Turbomachinery and exhaust noise; the use of advanced signal detection and source location techniques; and installation effects are discussed. Noise levels are close to those in the pre-jet era. A technology plateau has been reached, where no single engine noise source can be regarded as dominant, and further progress is possible only if significant improvement is made on all fronts.
Author (ESA)

N85-12243# Joint Publications Research Service, Arlington, Va.
CHARACTERISTICS OF LIGHT DIFFRACTION BY TWO ACOUSTIC WAVES, ONE WITH COMPLEX FREQUENCY COMPOSITION Abstract Only
Yu. G. Vasilyev *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 54 refs Transl. into ENGLISH from Radiotek. i. Elektron. (Moscow), v. 29, no. 5, May 1984 p 866-870 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N85-12666 California Univ., Berkeley.
MOLECULAR BEAM SCATTERING Ph.D. Thesis
Matthew Fowler Vernon 1983 391 p
Avail: Univ. Microfilms Order No. DA84138617

The molecular beam technique was used in three different experimental arrangements to study a wide range of inter-atomic and molecular forces. Results of a low energy (0.2 kcal/mole) elastic scattering study of the He-Ar pair potential are reported. The purpose of the study was to accurately characterize the shape of the potential in the well region, by scattering slow He atoms produced by expanding a mixture of He in N2 from a cooled nozzle. Measurements of the vibrational predissociation spectra and product translation energy for clusters of water, benzene, and ammonia are given. The experiments show that most of the product energy remains in the internal molecular motions. HCl yields NaCl, +H at collision energies of 5.38 and 19.4 kcal/mole are presented. Computer programs written to analyze molecular beam expansions are described. Dissert. Abstr.

N85-12667 Technische Univ., Munich (West Germany). Inst. fuer Mathematik.
FREE ENERGY AND EFFECTIVE MASS OF THE POLARON AT FINITE TEMPERATURES
D. P. L. Castrigiano, N. Kokiantonis, and H. Stierstorfer (Max-Planck Inst. fuer Plasmaphysik, Garching, West Germany) May 1984 15 p refs
(TUM-M8401) Copyright. Avail: Issuing Activity

Explicit expressions depending on two variational parameters are derived for the free energy and the effective mass of the Frohlich polaron at finite temperatures. The variation is carried out with Feynman's trial action and an arbitrary external electric force. All path integrals occurring in that connection are evaluated exactly. Asymptotic expressions in the weak and strong coupling case as well as diagrams for the main formulas are given. Author (ESA)

N85-12668# International Atomic Energy Agency, Vienna (Austria).
ISOTOPES IN DAY TO DAY LIFE
Jun. 1984 35 p Original contains color illustrations
(IAEA/PI/A.6E-84-00924) Avail: NTIS HC A03/MF A01

Developments are reported in the use of isotopic labeling and isotope irradiation in agriculture, medical science, hydrology, geochemistry, geophysics, environment pollution detection, and industries. Radioisotope instruments are described as well as techniques for gamma radiography, neutron radiography, and autoradiography. Isotope dating in geology and archaeology is covered. Basic scientific research topics in various areas are listed. A.R.H.

N85-12669# Pulse Sciences, Inc., San Leandro, Calif.
ACCELERATOR DEVELOPMENT IN SUPPORT OF THE NRL (NAVAL RESEARCH LABORATORY) BEAM DYNAMIC PROGRAM Final Report, 23 Mar. 1981 - 29 Feb. 1984
P. D. A. Champney, R. G. Altes, S. D. Putnam, I. D. Smith, and P. W. Spence Jul. 1984 195 p
(Contract N00014-81-C-2191)
(AD-A145976; AD-F300465; PSI-FR-21-129) Avail: NTIS HC A09/MF A01 CSCL 20/7

Electrical and mechanical designs, design packages, and supporting analyses are given and described in detail for: (1) new insulators and accelerating gaps for the NBS linear induction accelerator (LIA) to withstand voltages > or = 250 KV; (2) nine new LIA module and power supplies with specifications of (a) 500 KV, 0.5 micro sec, (b) 1 MV. 0.5 micro sec, and (c) 500 KV, 2 micro sec; (3) power supplies for the toroidal, vertical, capture, and image compensation field coils, for the modified betatron accelerator (MBA) at the conceptual design level; (4) the preliminary design package for the power supply of the toroidal field coil; and (5) the power transport system from the external electron beam accelerator to the internal betatron diode. GRA

N85-12670# Mission Research Corp., Alexandria, Va.
GYROTRON BEAM GENERATION WITH HELICAL MAGNETIC FIELDS Final Report
R. H. Jackson and C. A. Sedlak Aug. 1983 66 p
(Contract N00014-82-C-2206)
(AD-A145987; MRC/WDC-R-061) Avail: NTIS HC A04/MF A01 CSCL 20/7

This report presents the results of an investigation into the basic properties of a new type of electron gun for generating high transverse velocity beams, the bifilar helix - Pierce gun or H-gun. The H-gun differs significantly from presently used magnetron injection guns (MIGs) in that first a laminar, low transverse velocity

beam is formed and then transverse velocity is imparted by propagating the beam through the magnetic field of a bifilar helix. In order to evaluate the H-gun, an analytic and computational study was conducted to examine the relationships between the magnetic fields (axial and helical), and the beam properties after existing the helical field. The effects of the helix field entrance profile, the helix-axial field gyroresonance, and helix field gradients have been taken into account in the investigation. Based on the results of this research, conditions have been specified which will produce a high transverse velocity beam with low axial velocity spread. In particular, it has been found that an adiabatic helix entrance profile can provide a flexible means of generating high quality beams for gyro-devices. Author (GRA)

N85-12671# National Bureau of Standards, Boulder, Colo.
ELECTRON COLLISION PROCESSES IN MOLECULAR GASES Final Report, 1 Jan. 1981 - 30 Sep. 1984
A. V. Phelps 30 Sep. 1984 6 p
(Contracts MIPR-ARO-9-81; MIPR-ARO-8-82)
(AD-A146078; ARO-17703.3-PH) Avail: NTIS HC A02/MF A01 CSCL 20/8

The results obtained under this project include (1) the experimental determination of coefficients for the dissociation of molecules in electrical discharges, (2) the development of improved techniques for the prediction of the role of electron induced processes such as dissociation and ionization in discharges, and (3) the development of models of high pressure discharges. GRA

N85-12672# State Univ. of New York, Stony Brook. Dept. of Physics.
DECELERATION, COOLING, AND TRAPPING OF ATOMS Annual Summary Report, 22 Jul. 1983 - 21 Jul. 1984
H. J. Metcalf 12 Aug. 1984 39 p
(Contract N00014-83-K-0585; RR0-1103)
(AD-A146234) Avail: NTIS HC A03/MF A01 CSCL 20/8

A variety of calculations have been performed connected with laser cooling of atoms, many of them relevant to the experiments at NBS on this subject. Some of these have been tested and found to agree well with these experiments. We have designed, built, and tested various devices for use in these experiments. We have also done various calculations relevant to magnetic traps for cooled atoms. These are particularly well-suited for laser cooled atoms. GRA

N85-12673# Smithsonian Astrophysical Observatory, Cambridge, Mass.
THEORETICAL STUDIES IN MOLECULAR FRAGMENTATION: PROCESSES, ENERGETICS AND DIAGNOSTICS Annual Status Report, 1 Sep. 1983 - 31 Aug. 1984
K. P. Kirby 6 Sep. 1984 7 p
(Contract N00014-82-K-0536)
(AD-A146310; ASR-2) Avail: NTIS HC A02/MF A01 CSCL 07/4

Calculations of excited state potential energy curves and radiative lifetimes of CO and NH have been carried out in order to provide diagnostic data with which to identify and quantify the presence of product fragments resulting from the rapid decomposition of energetic materials. Large scale configuration interaction wavefunctions have been employed to obtain a high level of accuracy which will complement experimental spectroscopic measurements. Author (GRA)

N85-12674# Argonne National Lab., Ill. Materials Science and Technology Div.
DIFFRACTION BY THE TIME-OF-FLIGHT TECHNIQUE AT PULSED NEUTRON SOURCES
James D. Jorgensen Jun. 1984 7 p refs Submitted for publication
(Contract W-31-109-eng-38)
(DE84-015839; DOE/NBM-4015839;) Avail: NTIS HC A02/MF A01

The recent development of accelerator-based pulsed neutron sources as an alternative to reactor sources has caused a renewed interest in time-of-flight neutron diffraction techniques because the time-of-flight method can be optimally used at pulsed sources. Since neutrons have finite mass, and therefore travel at a velocity proportional to their wavelength, neutron diffraction can be done either by the conventional technique commonly used for X-rays, where a single wavelength is used, or by the time-of-flight technique. In a time-of-flight diffraction experiment, all wavelengths lambda are allowed to scatter from the sample and are determined by recording the times at which neutrons arrive at a detector in a fixed position. Neutron diffraction has been done by the time-of-flight technique for many years using mechanical neutron choppers at reactor sources, but found only limited application because the chopper instruments could not be properly optimized with respect to beam size, pulse width, and repetition rate. The new accelerator-based pulsed neutron sources produce neutrons in short, intense bursts, eliminating the need for mechanical choppers. The pulse width and repetition rate can be tailored to meet the requirements of a particular instrument. DOE

N85-12675# United Kingdom Atomic Energy Authority, Harwell (England). Materials Development Div.
EMISSION MECHANISMS IN THE LIQUID METAL ION SOURCE: A REVIEW
P. Marriott (Salford Univ.) and J. C. Riviere Jul. 1984 69 p refs (AERE-R-11294) Avail: NTIS HC A04/MF A01

Evidence is presented and compared in order to review the current understanding of the emission mechanisms in the liquid metal ion source. Energy distributions, neutral particle emission, and optical emission are considered, and the mechanisms proposed for the production of ionized atmos, molecules, droplets, and neutral particles are discussed. Author

N85-12698# Bonn Univ. (West Germany).
FINE STRUCTURE ANALYSIS WITH THERMAL NEUTRONS AND DEVELOPMENT AND CONSTRUCTION OF A MULTIDETECTOR SYSTEM [FEINSTRUKTURANALYSE MIT THERMISCHEN NEUTRONEN UND ENTWICKLUNG UND AUFBAU EINES MULTIDETEKTORSYSTEMS]
F. Elf, E. Jansen, I. Naday, F. Pfeiffer, W. Schaefer, and G. Will *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 61-73 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

N85-12708# Technische Univ., Munich (West Germany).
DIFFUSE ELASTIC AND INELASTIC NEUTRON SCATTERING OF DISORDER TRANSITIONS AND BOUNDARIES. PHASE DETERMINATION OF STRUCTURE FACTORS [DIFFUSE ELASTISCHE UND INELASTISCHE NEUTRONENSTREUUNG VON ONORDBUNGSUEBERGAENGEN UND GRENZFLAECHEN; PHASENBESTIMMUNG VON STRUKTURFAKTOREN]
H. Jagodzinski, W. Adlhart, H. Boysen, R. Forst, F. Frey, G. Lorenz, R. Martin, A. Pietraszko, E. Roshirt, J. Schneider et al *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 175-187 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

N85-12710# Technische Univ., Munich (West Germany).
DEVELOPMENT AND UTILIZATION OF ADVANCED METHODS OF NEUTRON SCATTERING [ENTWICKLUNG UND ANWENDUNG VON FORTGESCHRITTENEN METHODEN DER NEUTRONENSTREUUNG]
W. Glaeser *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 201-210 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

N85-12722# Technische Univ., Munich (West Germany).
CONSTRUCTION OF A COLD NEUTRON SOURCE AT FRM, MUNICH Status Report [BAU EINER KALTEN NEUTRONENQUELLE AM FRM MUENCHEN]
E. Kraehling and W. Glaeser *In* Kernforschungsanlage Rept. on

Res. Results in Solid State Nucl. Phys., Mar. 1984 p 333-346 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

N85-12724# Technische Univ., Munich (West Germany).
INVESTIGATION OF SPECIAL FACILITIES FOR A SPALLATION NEUTRON SOURCE [UNTERSUCHUNG VON SONDEREINRICHTUNGEN FUER EINE SPALLATIONS-NEUTRONENQUELLE]
K. Boening, W. Glaeser, R. Golub, H. Weber, and W. Glaeser *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 354-363 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

N85-12742# Technische Univ., Munich (West Germany). Dept. of Physics.
SPECTROSCOPIC INVESTIGATIONS ON NEUTRON INDUCED IMPURITY ATOMS AND RADIATION DEFECTS [EINFLUSS DER NEUTRONENBESTRAHLUNG AUF DIE OPTISCHEN EIGENSCHAFTEN VON TELLUR IN DER NAEHE DER BANDKANTE]
G. Fritsch, H. J. Coufal, U. Nagel, G. Maier, A. Schulte et al *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 590-1000 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

N85-12744# Technische Univ., Munich (West Germany).
VOLUME COMPRESSIBILITIES OF TRANSURANIUM ELEMENTS COMPOUNDS, ESPECIALLY OF NEPTUNIUM COMPOUNDS [VOLUMENKOMPRESSIBILITAETEN VON VERBINDUNGEN TRANSURANISCHER ELEMENTE, INSBESONDERE DES NEPTUNIUMS]
G. M. Kalvius *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 637-647 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

N85-12745# Technische Univ., Munich (West Germany).
REACTION MECHANISMS IN THE FORMATION OF INTERCALATION COMPLEXES, AND PROPERTIES OF INTERCALATED MOLECULES [REAKTIONSMECHANISMEN BEI DER BILDUNG VON INTERCALATIONKOMPLEXEN UND EIGENSCHAFTEN VON INTERCALIERTEN MOLEKUELEN]
H. Kammermeier, H. Meyer, H. Orth, and A. Weiss *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phy., 1980-1982 Mar. 1984 p 648-658 In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

N85-12746# Mainz Univ. (West Germany). Inst. fuer Biochemie.
NEUTRON SMALL ANGLE SCATTERING OF THE FREE AND MEMBRANE-BOUND ATPASE [NEUTRONENKLEINWINKELSTREUUNG DER FREIEN UND MEMBRANGEBUNDENEN ATPASE]
K. Dose, U. Eul, I. Nawroth, R. Pabst, S. Risi, N. Wagner, and H. Conrad (Kernforschungsanlage, Juelich, West Germany) *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 659-674 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

No abstracts in this category.

74 OPTICS

Includes light phenomena.

N85-12676# Texas Univ., Austin. Dept. of Elect. Engineering.
AUTOMATIC RECOGNITION AND TURBULING OBJECTS Annual Report, 1 Dec. 1982 - 31 Dec. 1983
J. K. Aggarwal 31 Dec. 1983 18 p
(Contract F49620-83-K-0013)
(AD-A145908; AFOSR-84-0771TR) Avail: NTIS HC A02/MF A01 CSCL 20/6

The report describes briefly the following three projects: (1) A Normalized Quadtree Representation and A Volume/Surface Octree Representation; (2) Analysis of a Model for Parallel Image Processing; and (3) Determination Motion Parameters Using Intensity and Range Information. GRA

N85-12677# Defence Research Establishment, Ottawa. (Ontario).
NOISE ANALYSIS OF THE COARSE OPTICAL POWER SPECTRUM ESTIMATOR (COPSE) DATA ACQUISITION SYSTEM
D. L. Desaulniers Mar. 1984 28 p
(AD-A145918; DREO-TN-82-8) Avail: NTIS HC A03/MF A01 CSCL 20/6

The various components of the COPSE Acquisition System are briefly summarized. The system is theoretically analyzed to determine what effect added Gaussian noise will have on its performance. On linear mode, the Gaussian noise was found to negate the quantization effect of the system provided the variance of the noise was high enough. On log mode, the system was found to perform better in the low photo-diode current range.
Author (GRA)

N85-12678# Minnesota Univ., Minneapolis.
ANALYSIS OF ACCRETION AND DELETION AT BOUNDARIES IN DYNAMIC SCENES
K. M. Mutch and W. B. Thompson May 1984 13 p
(Contract F49620-83-C-0140)
(AD-A145944; TR-84-7; AFOSR-84-0796TR) Avail: NTIS HC A02/MF A01 CSCL 20/6

Locating object boundaries in images is an important but difficult problem. Intensity-based edge detection provides ambiguous or misleading boundary information in many situations, such as textured regions. Motion-based techniques can provide more reliable results in these cases. At object boundaries where occlusion occurs, surface regions will typically appear or disappear over time when motion is present. These regions of changing visibility may be used to indicate both object boundaries and the side of the boundary corresponding to the occluded surface. Thus, in dynamic scenes, regions of surface accretion or deletion can be found using matching technique similar to those used to determine optical flow in an image sequence. Regions in one frame that are not adequately matched by any region in previous frames correspond to accretion. Regions that have no matches in subsequent frames correspond to deletion. In either case, an occlusion boundary is present. Furthermore, by associating accretion or deletion regions with a surface on one side of a boundary, it is possible to determine which side of the boundary is being occluded. This association can be based purely on visual motion - the accretion or deletion region moves with the same image velocity as the remaining visible surface to which it is attached. GRA

N85-12679# IBM Research Lab., San Jose, Calif.
OPTOACOUSTIC SPECTROSCOPY
A. C. Tam 15 Jun. 1984 42 p
(Contract N00014-83-C-0170)
(AD-A145995; RJ-4328; TR-10) Avail: NTIS HC A03/MF A01 CSCL 20/6

The technique of optoacoustic spectroscopy on the use of modulated or pulsed light beams to produce, directly or indirectly, acoustic waves or pulses in a gaseous or condensed sample, as the excitation beam is scanned in wavelength, an excitation spectrum, called optoacoustic (or photoacoustic) spectrum, is

produced. This paper reviews some of the theories and experiments in this field. GRA

N85-12680# Wisconsin Univ., Milwaukee.
HOLOGRAPHIC DISPLACEMENT ANALYSIS WITH FIBER OPTICS Final Report, 9 Jul. 1980 - 8 Jul. 1984
J. A. Gilbert Aug. 1984 21 p
(Contract DAAG29-80-K-0028)
(AD-A146185; ARO-17357.19-EG) Avail: NTIS HC A02/MF A01 CSCL 20/6

The aim of the research reported here was to incorporate optical fibers into systems designed to measure deformation in production-related or in-situ applications where conventional techniques would be difficult or impossible to apply. GRA

N85-12681# University of Southern California, Los Angeles. Optical Materials and Devices Lab.
DIELECTRIC AND OPTICAL PROPERTIES OF SPUTTERED THIN FILMS Final Technical Report, 15 Sep. 1979 - 14 Sep. 1983
A. R. Tanguay, Jr. Jul. 1984 135 p
(Contracts DAAG29-79-C-0175; F19628-83-C-0031)
(AD-A146210; USC/OMDL-1101; ARO-16291.3-PH) Avail: NTIS HC A07/MF A01 CSCL 20/6

Of critical importance to the eventual performance of numerous coherent optical image processors and highly parallel computers is the development of a high speed, recyclable, linear, high resolution, selectively erasable image storage transducer operable in nearly real time. Applications for such a transducer abound, including incoherent-to-coherent conversion, pattern recognition and image feature extraction, level slicing, edge enhancement, low light level image integration, scratch pad memory, and page composition for data entry in holographic memory systems. In response to this need, a wide variety of candidate devices have been proposed in the past ten years, based on photochromic, liquid crystal, photorefractive, magnetooptic, electrooptic, deformable membrane, thermoplastic, photodichroic, and ambidextrous effects in numerous configurations. The device category comprised of Electrooptic Spatial Light Modulators contains a number of leading candidates, due to a combination of wide dynamic range, high sensitivity, intermediate storage time, relative simplicity of construction and operation, and long term durability. This category includes the Pockels Readout Optical Modulator or PROM, a Soviet modification of th PROM called the PRIZ, the Microchannel Spatial Light Modulator, the TITUS and photo-TITUS, and the Photorefractive Incoherent-to-Coherent Optical Converter. GRA

N85-12682# Cincinnati Univ., Ohio. Solid State Electronics Lab.
INTEGRATION OF DETECTORS WITH OPTICAL WAVEGUIDE STRUCTURES Interim Report, 15 Mar. 1983 - 14 Mar. 1984
J. T. Boyd 15 May 1984 31 p
(Grant AF-AFOSR-0130-81)
(AD-A146278; AFOSR-84-0777TR) Avail: NTIS HC A03/MF A01 CSCL 17/8

Progress in several areas regarding the integration of photodetectors with optical waveguide structures is presented. In the area of formation of photodetector arrays on layers of laser-recrystallized polycrystalline silicon, progress has occurred in using antireflection stripes to control the location of grain boundaries. Large areas free of grain boundaries are then available for photodetector fabrication. A 6mm x 5mm test chip containing photodetector arrays, switching MOS transistors, and a number of other test devices has been designed and masks fabricated. This test chip has been fabricated with operation just demonstrated. Detailed testing of this chip is now underway. GRA

N85-12683# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
DEVELOPMENTS IN FAR-INFRARED DETECTION TECHNIQUES
K. Fanping and L. Yongxiang 6 Aug. 1984 19 p Transl. into ENGLISH from Wuli (China), v. 12, no. 10, Oct. 1983 p 598-603 (AD-A146290; FTD-ID(RS)T-0851-84) Avail: NTIS HC A02/MF A01 CSCL 17/5

Developments in far-infrared detection techniques are discussed. Detection mechanisms, photoconductive detectors, transrectification detectors, and transmission problems are discussed. R.J.F.

N85-12684# Naval Submarine Medical Research Lab., Groton, Conn.
VISIBILITY OF VARIOUS TARGET-BACKGROUND COLOR COMBINATIONS UNDER DIFFERENT CHROMATIC AMBIENT ILLUMINATIONS Interim Report
D. F. Neri, S. M. Luria, and D. A. Kobus 24 Aug. 1984 23 p
(M01-00)
(AD-A146348; NSMRL-1027) Avail: NTIS HC A02/MF A01 CSCL 20/6

The detectability of seven colors presented on a CRT against four background colors was measured under four conditions of ambient lighting. Opponent color pairs were most quickly detected. Detection was enhanced by maximizing both luminance and color contrast, but luminance contrast was much more effective. Chromatic ambient lighting which was a log unit dimmer than the target luminance had no effect on performance. Author (GRA)

N85-12685# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
COMPARISON OF WIDE APERTURE AND SHORT RESIDENCE TIME ION LENSES
J. E. Delmore 1 Jun. 1984 3 p refs Presented at 32nd Ann. Conf. on Mass Spectry. and Allied Topics, San Antonio, 27 May 1984
(Contract DE-AC07-76ID-01570)
(DE84-015274; EGG-M-11184; CONF-8405185-2) Avail: NTIS HC A02/MF A01

A series of ion lens configurations were computer modeled using the program SIMION. The intermediate inversion point characteristic of ion lenses used in most analytical mass spectrometers is eliminated. The first inversion point is at the focal point of the lens. The potential gradient in the ionization region is increased substantially. This reduces the residence time of an ion in the lens, which is desirable, although it has the undesirable effect of increasing the energy spread of ions produced by electron bombardment. This energy spreading effect does not occur in sources where the ions are made on a surface, such as surface ionization, field desorption, SIMS, FAB, etc. This is determined by the potential difference across the region in which ions are produced. The importance of residence time comes from the kinetic energy of the ion prior to acceleration. This kinetic energy is in random directions, and defocuses the ion beam with increasing ion residence time. Two of the more promising designs were constructed and tested with rhenium ions generated by positive self surface ionization. DOE

N85-12686# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany). Abteilung Optik.
INFLUENCE OF GEOMETRIC CONDITIONS ON THE INDICATRIX OF REFLECTION OF THE PERFECT REFLECTING DIFFUSER [EINFLUSS GEOMETRISCHER BEDINGUNGEN AUF DIE REFLEXIONSINDIKATRIX DES VOLLKOMMEN MATTWEISSEN KOERPERS]
W. Erb and M. Krystek Jun. 1984 28 p refs In GERMAN; ENGLISH summary
(PTB-Opt-16; ISSN-0341-6712) Avail: NTIS HC A03/MF A01

The angular distribution of the radiation reflected by the perfect reflecting diffuser (PRD) was calculated for geometric conditions of gonioreflectometers. Different distributions are found depending on whether the irradiated area of the PRD is totally or partially measured. In the first case the indicatrix of reflection is a sphere. Author (ESA)

N85-12687# Rolls-Royce Ltd., Derby (England). Electronics and Measurement Techniques Dept.
THE APPLICATIONS OF FIBRE OPTICS IN GAS TURBINE

ENGINE INSTRUMENTATION
I. Davidson 3 May 1984 12 p refs
(PNR-90209) Avail: NTIS HC A02/MF A01

Fiber optic instrumentation in aircraft engines is reviewed. Data transmission, endoscopy, flame detection, radiation pyrometry, laser anemometry, blade tip clearance sensors, and pinhole cameras are described. Author (ESA)

N85-12688# Optische Werke G.m.b.H., Wedel (West Germany). Optische-physikalische Entwicklungsabteilung.
DEVELOPMENT OF A MEASURING PROCEDURE FOR THE AUTOMATIC EVALUATION OF THE FLATNESS OF REFLECTIVE SURFACES Final Report, Dec. 1983
Willy Fahland Bonn Bundesministerium fuer Forschung und Technologie Aug. 1984 21 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-84-168; ISSN-0340-7608) Avail: NTIS HC A02/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 4.50

A measuring procedure was developed for the automatic determination of the flatness of polished planes and the sphericity of polished ball-type surfaces. This determination results from the space measurement of interference fringes with standard instruments and diode lines or a digital TV-camera. The measuring procedure particularly suits interferometers in the workshop. The reproducibility is lambda 170 (lambda = 633nm) and meets requirements for normal applications. Author (ESA)

N85-12689# National Bureau of Standards, Washington, D.C. Center for Manufacturing Engineering.
FREE-SPACE PROPAGATION OF LIGHT PULSES
E. Marx May 1984 54 p refs
(PB84-217108; NBSIR-84-2835) Avail: NTIS HC A04/MF A01 CSCL 20F

A transient electromagnetic field in free space is completely specified when the initial values of the electric and magnetic fields are given. The Green's function for the scalar wave equation can then be used to find the field at later times. A group of computer programs that implement these equations and process the output are presented. Author (GRA)

N85-12690# National Bureau of Standards, Washington, D.C.
SELF-STUDY MANUAL ON OPTICAL RADIATION MEASUREMENTS. PART 1: CONCEPTS. CHAPTER 11: LINEARITY CONSIDERATIONS AND CALIBRATIONS Final Report
J. B. Shumaker Apr. 1984 45 p refs
(PB84-218346; NBS/TN-910-7-Pt-1-Ch-11) Avail: NTIS HC A03/ A01; SOD HC $2.00 as SN-003-003-02577-1 CSCL 20F

This is the seventh in a series of Technical Notes (910) entitled Self-Study Manual on Optical Radiation Measurements. In this chapter the author reviews the radiometric treatment of a non-linear radiometer. The emphasis is on the underlying radiometric principles and the experimental evaluation of a true response function so that such real radiometer-output signals can be used in the idealized equations appropriate for linear radiometers. Several common techniques are discussed: beam addition, beam attenuation, the inverse-square law, and a number of other techniques in which non-radiometric measurements provide some or all of the basis for the response-function calibration. Many references are given; they should permit the reader to pursue the experimental details of any of the techniques in greater depth. GRA

N85-12214# Joint Publications Research Service, Arlington, Va.
FIBER OPTICS DEVELOPMENT, PROSPECTS ASSESSED
Bogdan Marks *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-038) 25 Oct. 1984 p 25-32 Transl. into ENGLISH from Przeglad Tech. (Warsaw), no. 29, 15 Jul. 1984 p 14-15 (For primary document see N85-12210 03-31)
Avail: NTIS HC A04/MF A01

N85-12242# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF MODE NOISE SUPPRESSION IN MULTIMODE FIBER OPTIC LIGHT GUIDES Abstract Only
V. Yu. Petrunkin, O. I. Kotov, and V. N. Fillipov *In its* USSR Rept.: Electron. and Elec. Engr. (JPRS-UEE-84-014) 15 Oct. 1984 p 51 Transl. into ENGLISH from Z. Tek. Fiz., v. 54, no. 5, May 1984 p 883-887 (For primary document see N85-12215 03-31)
Avail: NTIS HC A04/MF A01

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N85-12691# Naval Research Lab., Washington, D. C.
SELF POTENTIALS OF AN ELECTRON RING IN A TORUS FOR LARGE RING DISPLACEMENT FROM THE MINOR AXIS Interim Memorandum Report
C. A. Kapetanakos and P. Sprangle 29 Aug. 1984 25 p
(DA Proj. RR0-1109)
(AD-A146088; AD-E000597; NRL-MR-5388) Avail: NTIS HC A02/MF A01 CSCL 20/7

We have computed the electric self potential and the magnetic self vector potential for a circular cross section electron ring inside a perfectly conducting toroidal chamber for large ring displacement from the minor axis of the torus. These potentials can provide valuable insight on the non linear dynamics of the intense electron rings. GRA

N85-12692# Pennsylvania State Univ., University Park.
STUDY OF PLASMA CONVECTION AND WALL INTERACTIONS IN MAGNETIC CONFINEMENT SYSTEMS Progress Report, 1 Oct. 1982 - 30 Nov. 1984
T. M. York Jun. 1984 134 p refs
(Contract DE-AC02-76ET-53018)
(DE84-013959; DOE/ET-53018/12) Avail: NTIS HC A07/MF A01

Studies of compact toroid formation and lifetime in high fill pressure discharges are reported. Extended lifetimes without rotation disruption and with low indicated resistivity were identified experimentally. Numerical codes modeled static and translating CT plasmas. Nd:Glass lasers for Thomson scattering diagnostics were studied in detail. Comparison of system performance achieved with ruby, Nd:Glass and Nd:Glass/KDDP sources is reported. Performances of a single pulse 80 J system and a 10 ms mode-locked system were defined by basic experimental studies. DOE

N85-12693# Naval Research Lab., Washington, D. C.
VACUUM INDUCTIVE PULSED POWER COMPRESSION FOR INERTIAL CONFINEMENT FUSION
G. Cooperstein, R. A. Meger, J. R. Boller, R. J. Colombant, S. A. Goldstein (Jaycor, Inc., Alexandria, Va.), R. Kulsrud (Jaycor, Inc., Alexandria, Va.), S. McDonald (Maryland Univ., Coll. Park), J. M. Neri, W. F. Oliphant, P. F. Ottinger (Jaycor, Inc., Alexandria, Va.) et al 1984 2 p refs Presented at the 10th Intern. Conf. on Plasma Phys. and Controlled Nucl. Fusion Research, London, 12 Sep. 1984 Sponsored in part by Navy and DNA
(Contract DE-AC04-76DP-00789)
(DE84-010935; SAND-84-0893C; CONF-840910-1) Avail: NTIS HC A02/MF A01

Light ion beam inertial confinement fusion (ICF) requires a short (approx. 15 nsfc), high power (approx. 100 TW) ion beam to symmetrically irradiate a pellet. The United States light ion beam ICF program is centered at Sandia National Laboratories (SNL) where two super power generators are located. The PBFA I generator, presently in operation, uses Marx and pulse-line technology to deliver hundreds of kilojoules of energy in a 40 to 50 nsec pulse to an ion beam diode. This system consists of

36 smaller generators added in series and parallel combinations near the load. The next generation system, known as PBFA II, is presently under construction at SNL. This system is to be modular and is to be capable of delivering megajoules of energy to a load. In order to take full advantage of the available energy from these generators, the effect of inter-module jitter must be minimized to symmetrize the power flow, and the pulse width narrowed to approx. 10 nsec to attain some degree of power multiplication. DOE

N85-12694# FOM-Inst. voor Plasmafysica, Rijnhuizen, Jutphaas (Netherlands).
A HIGH TRANSMISSION, 20 CHANNEL POLYCHROMATOR FOR THE THOMSON SCATTERING DIAGNOSTIC OF TORTUR 3
C. J. Barth Jun. 1984 39 p refs Sponsored by Euratom and Nederlandse Organisatie voor Zuiver-Wetenschappelijk Onderzoek (ZWO)
(Rept-84-156) Avail: NTIS HC A03/MF A01

In order to study Thomson-scattered spectra observed in TORTUR plasma, which show systematic deviations with respect to a Gaussian profile, a 20-channel spectrometer was designed and constructed to replace a 10-channel apparatus. The transmission of the spectrometer is increased by a factor 2.5 to 45% by using wavelength selection mirrors instead of fiber optics to direct the analyzed spectrum to the photomultiplier array. Electron temperatures and densities can be determined with a 5% error at values of 800 eV and 5 times 10 to the 19th power/cum. The detection limit of the diagnostic is improved to ne = 3 times 10 to the 18th power/cum at Te = 500 eV. Author (ESA)

N85-12695# United Kingdom Atomic Energy Authority, Harwell (England). Materials Development Div.
REVIEW: ROLE OF REFRACTORY METAL ALLOYS IN FUSION REACTOR APPLICATIONS
D. J. Mazey and C. E. English Jun. 1984 69 p refs Sponsored in part by Culham/EURATOM Fusion Association
(AERE-R-11317) Avail: NTIS HC A04/MF A01

The role of the refractory metal alloys is considered in relation to their possible application for future thermonuclear fusion reactor systems. Assessment of the availability and properties of the refractory metals indicates that alloys of V, Nb, and Mo are most likely to play a major role in reactor systems. The operating environment of a fusion reactor and the materials constraints that are imposed by radiation damage effects and plasma-wall interactions are considered briefly. The metallurgical aspects of the refractory metals and their alloys are then reviewed, followed by an assessment of the existing data base on the effects of neutron and ion irradiation on physical and mechanical properties. Consideration is also given to the effect of specific environments on alloy properties and to the industrial base and availability of refractory metal alloys. The review concludes with a brief summary in which it is proposed that alloys based on vanadium offer the best potential for long-term fusion reactor applications for reasons of low induced radioactivity and good structural stability under irradiation. R.S.F.

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N85-12696# Kernforschungsanlage, Juelich (West Germany). Projekttraegerschaft fuer Nukleare Festkoerperforschung und Nuclearchemie.
REPORT ON RESEARCH RESULTS IN SOLID STATE NUCLEAR PHYSICS, 1980-1982 [BERICHT DES GUTACHTERAUSSCHUSSES: NUCLEARE FESTKOERPERFORSCHUNG, 1980-1982]
Mar. 1984 756 p refs Partly in GERMAN and ENGLISH
(JUEL-Spez-250; ISSN-0343-7639) Avail: NTIS HC A99/MF A01

Research results obtained from 1980 to 1982 at German universities in the field of solid state physics by means of neutron scattering and other nuclear methods are reported. Crystal structure and chemical bonds were studied. Chemical reactions, polymers and biological macromolecules were investigated. The movement of the atoms in solid state matter, magnetic phenomena, and phase transitions were studied. Defect ordering, crystal defects, amorphous substances, and fluids were investigated. Instrumental and methodical developments were made. For individual titles, see N85-12697 through N85-12753.

N85-12697# Marburg Univ. (West Germany).
MAGNETIC PROPERTIES OF INTERMETALLIC PHASES AND SIMPLE SYSTEMS [MAGNETISCHE EIGENSCHAFTEN VON INTERMETALLISCHEN PHASEN UND VON EINFACHEN SYSTEMEN]
W. Reimers, E. Hellner, and W. Treutmann *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 38-60 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

Neutron diffraction studies were made on intermetallic compounds and simple model systems in order to determine their magnetic properties. The effects of interlattice occupation on the electronic structure of MnSb was investigated on Mn1.09 Sb and MnFe0.09 Sb with polarized neutrons. The spin density shows deviations from the spherical distribution in the Mn-atoms, which can be described by the separated adaptation of the energy levels occupation. Comparison of the results with data from the literature show connections with changes in the physical properties. The quasi-two-dimensional mixed crystal system Rb2G1-x MnxCl4 (x between 0 and 1) is characterized by competing exchange interactions between the ferromagnetic Cr and the antiferromagnetic Mn. Neutron diffraction allows researchers to fully determine structural and magnetic phase diagrams. Author (ESA)

N85-12698# Bonn Univ. (West Germany).
FINE STRUCTURE ANALYSIS WITH THERMAL NEUTRONS AND DEVELOPMENT AND CONSTRUCTION OF A MULTIDETECTOR SYSTEM [FEINSTRUKTURANALYSE MIT THERMISCHEN NEUTRONEN UND ENTWICKLUNG UND AUFBAU EINES MULTIDETEKTORSYSTEMS] **c72**
F. Elf, E. Jansen, I. Naday, F. Pfeiffer, W. Schaefer, and G. Will *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 61-73 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

A space resolving scintillation detector was developed and installed on the two-cycle diffractometer KATINKA. The special advantages of the detector are its high demonstration probability for short wave neutrons (75% for 1.3A), good space resolution (2.5 mm FWHM) and high measuring point density. The detector is especially suited for a reliable application of the reflex profile analysis in the evaluation of powder diagrams. For that purpose, a program scheme was developed consisting of two distinct steps: determination of the observed integrated intensities by profile analysis (GAUFIT), and least squares refinement of the structure parameters (POWLS). The structure analyses relate to magnetic ordering phenomena in ternary compound and mixed crystal systems. Single crystal structure analyses were conducted for the localization of hydrogen, e.g., in natural zeolites. Neutron diffractometry was used for texture investigations on geological probes; the measurements complete the X-ray diffraction measurements. Author (ESA)

N85-12699# Tuebingen Univ. (West Germany).
STATIC AND DYNAMIC DISORDERING IN AMORPHOUS MAGNETS AND CRYSTALS [STATISCHE UND DYNAMISCHE FEHLORDNUNG IN AMORPHEN MAGNETEN UND KRISTALLEN]
K. Arnold, Th. Brueckel, K. Flad, B. Frick, P. Gerlach, D. Hohlwein, A. Hoser, J. Ihringer, I.-R. Jahn, M. Kabs et al *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 74-91 refs In GERMAN (For primary document

see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

Magnetism in glasses and mixed crystals, and disordering in molecular crystals were investigated; a flat-cone neutron diffractometer was developed. The study of the statics and dynamics of the magnetic ordering in glasses with higher energy resolution confirms that the magnetic ordering is purely dynamic-relaxating. In the magnetic mixed crystals of the granite type a coexistence is found of incompatible magnet structure and a strong magnetic disorder which is explained with a model of frustrated magnetic connections. For the investigation of disorder in molecular crystals, phenomelogical and microscopic models for the interpretation of diffraction data were further developed. The microscopic model yields the rotation potential, allowing one to predict that at low temperatures the disorder of small molecules is a purely quantummechanical effect; this is proven with experiments on (NH4)2 SnCl6. A flat-cone neutron diffractometer with multicounter, a sensitive neutron image converter, and a gas high pressure cell are developed for scattering experiments. Author (ESA)

N85-12700# Technische Hochschule, Darmstadt (West Germany).
INVESTIGATIONS OF MAGNETIC PHASE TRANSITIONS WITH NEUTRON SCATTERING [UNTERSUCHUNGEN MAGNETISCHER PHASENUEBERGAENGE MIT NEUTRONENSTREUUNG]
H. Weitzel, J. Hirte, and H. Astheimer *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 92-99 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

Magnetic exchange interactions in solid state materials were investigated. The multicritical phenomena in magnetic field induced magnetic phase transitions in metamagnets were studied on FeCl2-2H2O and COCl2-2H2O using neutron scattering. It is found that the magnetic field-temperature diagram of the Fe-compound has, starting from the Neel point, a lambda-line of continuous phase transitions between the antiferromagnetic phase AF at low temperatures and field strengths, and the paramagnetic phase P. The Co-compound shows essentially a similar behavior. Local magnetic excitations in organic four-nuclei complexes were studied by scattering experiments on two Cu(II) clusters. The spectra show a very strong excitation at 3 meV of nonmagnetic origin.
Author (ESA)

N85-12701# Technische Univ., Berlin (West Germany).
METAMAGNETIC SYSTEMS [METAMAGNETISCHE SYSTEME] **c70**
A. Axmann, H. Dachs, K. Kakurai, F.-J. Kasper, J. K. Kjems (Riso National Lab., Roskilde, Denmark), W. Knop, A. H. Millhouse, and M. Steiner *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 100-111 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

Several materials and classes of appearance forms of metamagnetic systems were investigated. The study of the tricritical point in the magnetic phase diagram of DyPO4 shows extreme experimental difficulties in the definite determination of such a tricritical point, and in the precise localization of the magnetic field-temperature diagram. Noncommensurable magnetic structures were investigated in MnOOH and CsFeCl3. For MnOOH, the correlation between symmetry and magnetic structure, magnetic preordering above the ordering temperature and spin wave dispersion was studied. In the singlet-ground state system CsFeCl3 the evolution of the ordering parameters and the different magnetic phases are determined. Solitons were observed in the one-dimensional ferromagnet CsNiF3. The magnetic form factor of the soliton component transverse to the applied field is determined, allowing a delimitation between solitons and multimagnon processes. Author (ESA)

N85-12702# Technische Univ., Berlin (West Germany).
INVESTIGATION OF DOMAIN STRUCTURES AND WALLS USING NEUTRON DIFFRACTION [UNTERSUCHUNG VON DOMAENENSTRUKTUREN UND BLOCHWAENDEN MITTELS NEUTRONENBEUGUNG]
G. Hildebrandt (Max-Planck Gesellschaft, Berlin) and W. Treimer *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 112-124 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

Domain structures and domain walls in FeSi and Ni were investigated with neutron diffraction. The quantitative evaluation of neutron small angle scattering experiments on Fe-4 at % Si-single crystals provides the inner structure and details of the domain walls. The static method to determine the exchange constants for Fe-4 at % Si from the wall thickness can be applied to all crystals with regular structure provided a spatial separation of the neutron beams diffracted on the walls be possible. The successive diffraction on several walls and the multiple diffraction on parts of a single wall were studied. The dependence of the structure on the magnetic field allows one to confirm theoretical predictions concerning micromagnetism. For grazing incidence of neutrons on a 90 deg wall in the range of the critical brightness, angle total reflection occurs as predicted by theory. Neutron topography for the visualization of inner domains and walls was developed. The first results concerning domain structure inside single Ni-crystals are obtained. Neutron optics experiments and calculations on the dynamic theory of neutron interferences for unpolarized neutrons were conducted. Author (ESA)

N85-12703# Johann-Wolfgang-Goethe-Univ., Frankfurt am Main (West Germany). Inst. fuer Kristallographie und Mineralogie.
CRYSTAL CHEMISTRY AND REAL STRUCTURE OF CRYSTALS [NEUTRONENSTREUUNG ZUR KRISTALLCHEMIE UND ZUM REALBAU VON KRISTALLEN]
H. Bartl, J. W. Bats, W. Dyck, H. Fuess, A. Gregory, W. Joswig, W. Lottermoser, M. Koerfer, R. Mueller, B. P. Schweiss et al *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 126-138 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

Elastic and inelastic scattering, X-ray diffraction and spectroscopy were combined to obtain a comprehensive picture of the properties of crystals. The electron density distribution allows one to verify the models of the theoretical chemistry. Systematic investigations of chemically similar anions (ClO3 and ClO4; S2O3, SO3 and SO4) show differences in bonding and reaction capability. The X-ray-neutron method applied to these anions shows maxima between 0.2 and 0.4 eXA to the power-3 in the bondings of the unbound electrons on S and D. For the SO3-group good agreement is found with theoretical calculations. The effect of the Mg (two times ionized) cation on the density is demonstrated on the water molecules of MgS2O3.6H2O and MgSO3.6H2O. Magnetic structure and magnetization density were investigated on CO3-V2O8, Fe2SiO4 and Mn2SiO4 with polarized neutrons. The differences in magnetic moments of both cation states is also demonstrated for Fe2SiO4 with complementary Mossbauer measurements. Inelastic time of flight experiments allow predictions concerning the motion of the NH3-group in aniliniumbromide and of the water molecule in natural zeolites. The theoretical model to calculate the photon dispersion on CaSO4 shows good agreement with the measured dispersion curves. Author (ESA)

N85-12704# Technische Univ., Munich (West Germany).
NEUTRON SCATTERING ON THE FRM DOUBLE CRYSTAL SPECTROMETER [NEUTRONENSTRUUNG AM DOPPELKRISTALLSPEKTROMETER DES FRM]
G. Schubert and E. Luescher *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 139-145 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

The neutron double crystal backscatter method was used to measure the relative lattice constant change. The accuracy is of the order 10 to the power -7. The measurement allows one to determine volume-averaged data. The crystal size results from

neutral beam dimensions. The macroscopic relative length dilatation is measured with a HeNe-laser Michelson interferometer. Results are obtained for the macroscopic thermal dilatation of Na in the temperature range between 30 and 85 C. Further results were not obtained due to certain problems. Author (ESA)

N85-12705# Dortmund Univ. (West Germany).
NEUTRON INTERFEROMETRY AND DOUBLE DIFFRACTOMETER FOR CONDENSED MATTER [NEUTRONEN-INTERFEROMETRIE UND- DOPPELDIFFRAKTOMETRIE AN KONDENSIERTEN STOFFEN] c35
U. Bonse, U. Kischko, A. Rumpf, T. Wroblewski, and I. Hartmann-Lotsch *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 146-155 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

A neutron interferometer and a crystal interferometer were developed. The interferometer has a stability, sensitivity, and reproductibility in the range of 10 to the power-4, relatively. Intensity profiles in interference models were systematically studied. The effects of gravitation on neutron interference is shown. Precise values of the coherent scattering lengths of tritium, cobalt, uranium, and silver and its isotopes are determined. Scattering length densities of polymer solutions are obtained. An oscillating (accelerated) interferometer was put into service. Superposition of coherent spin states is explicitly demonstrated experimentally. Ferromagnetic domains are shown by neutron phase contrast. Author (ESA)

N85-12706# Technische Univ., Munich (West Germany).
NEUTRON SCATTERING ON MAGNETIC STRUCTURES AND AT MAGNETIC PHASE TRANSITIONS [NEUTRONENSTREUUNG AN MAGNETISCHEN STRUKTUREN UND BEI MAGNETISCHEN PHASENUEBERGAENGEN] c70
R. Anders, T. Faisst, W. vonHoersten, P. Kournettas, E. Roeber, K. Stierstadt, E. Steichele, J. Schelten, and D. Schwahn *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 156-165 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

Magnetic structures and magnetic phase transitions were investigated using neutron scattering. A backscatter diffractometer was built to measure the critical behavior of the thermal expansion and the elastic constants of nickel at the Curie temperature. The temperature dependence of the magnetic dislocation scattering in nickel was studied. The measurements were carried out at constant exchange lengths and are in good agreement with theory. Precipitation kinetics and shape of cobalt particles in copper single crystals were investigated. The particles have an octahedric form determined by elastic interaction with the lattice. An ordering of the particle distances is observed. The growth in the direction <100> is favorized by a magnetic field applied in this direction. The anisotropic diffusion constants of Co and Cu are determined. Author (ESA)

N85-12707# Mainz Univ. (West Germany).
MAGNETISM OF THE RARE EARTH COMPOUNDS [MAGNEISMUS DER SELTENEN-ERD-VERBINDUNGEN] c70
K. Knorr, A. Loidl, H. Wehr, R. Feile, F. Kenntner, and G. Dittel *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 166-174 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

Magnetism of rare Earth (RE) compounds was investigated using neutron scattering and muon spin rotation measurements. The crystal electric fields are determined for a series of RE Mg2 and RE X3 (X = In, TL, Sn, Pb) by neutron spectroscopy. The damping of crystal electric field excitations based on exhcange scattering with the conduction electrons was studied. A decrease of damping at the onset of superconductivity is found in T6-compounds. Diffraction measurements on ErPb3 and similar compounds show that these systems have modulated spin structures. The exchange coupling in T6P is found to be strongly anisotropic. Muon spin rotation measurements were performed on LaAg1-X, InX, Ce, Ce1-X, ThX and a series of REX3-compounds. The combination of muon Knight shift results and susceptibility data allows one to obtain a first-empirical undertanding of this new measurement method in RE-compounds. Author (ESA)

N85-12708# Technische Univ., Munich (West Germany).
DIFFUSE ELASTIC AND INELASTIC NEUTRON SCATTERING OF DISORDER TRANSITIONS AND BOUNDARIES. PHASE DETERMINATION OF STRUCTURE FACTORS [DIFFUSE ELASTISCHE UND INELASTISCHE NEUTRONENSTREUUNG VON ONORDBUNGSUEBERGAENGEN UND GRENZFLAECHEN; PHASENBESTIMMUNG VON STRUKTURFAKTOREN] c72
H. Jagodzinski, W. Adlhart, H. Boysen, R. Forst, F. Frey, G. Lorenz, R. Martin, A. Pietraszko, E. Roshirt, J. Schneider et al *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 175-187 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

Ordering phenomena were investigated in structures with aliphatic intercalations (urea inclusion compounds, polyiodide, tungsten salts). Neutron and X-ray scattering were used to determine the host-and guest structures. In the case of E2PI1.6, a quantative analysis of the diffuse scattering shows the temperature dependent behavior of the chains. In urea inclusion compounds, strongly coupling structure chains lead to a sequence of different ordering states. The correlation between phase transitions and domain building were investigated by the interpretation of elastic and inelastic scattering parts. The problems of specific boundaries are demonstrated taking the beta quartz structure as an example, and are understood by the development of theoretical models showing that predictions concerning boundaries chemistry are possible with complementary X-ray and neutron data. The correlation between polytype structures, defects ordering, and transitions was studied. In the case of ZnS, it is shown that the transition ZnSc to ZnSh via nucleus building occurs in the solid state, whereby the transformation itself proceeds through complex mechanisms and can stick in the most different structural intermediate states. The preliminary experimental investigations on alfa-phenazine aiming at phase determination of structure factors via multiple scattering give hints about cases in which the neutron scattering method can favorably be used. Author (ESA)

N85-12709# Bayreuth Univ. (West Germany).
ANHARMONIC LATTICE EFFECTS IN MOLECULAR CRYSTALS [ANHARMONISCHE GITTEREFFEKTE IN MOLEKUELKRISTALLEN]
J. Klaus, H. C. Alt, H. Effer, R. Haagen, P. Hurych, V. K. Jindal, J. Jordan, J. Schleifer, and U. Schmelzer *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 188-200 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

Anharmonic phenomena in molecular crystals was investigated, starting from the measurement of harmonic phonons in naphthalene and anthracene, of phonon energies, and partially of phonon polarization vectors, and from the compressibility measurement of naphthalene at several temperatures. The temperature dependence of the phonon's energy from 12 to 350 K, and of the line width of some selected phonons from 12 to 350 K was studied. The measured compressibility of naphthalene enables one to determine the increase in phonon energy with temperature at constant volume. This result is confirmed by a theory, taking into account phonon-phonon interaction, via extensive calculations and under the assumption of simple potential laws. The same theory provides results concerning the phonon line widths in naphthalene and anthracene which partially confirm measured data. A single unified theoretical law thus enables one to describe harmonic as well as anharmonic phonon characteristics. Author (ESA)

N85-12710# Technische Univ., Munich (West Germany).
DEVELOPMENT AND UTILIZATION OF ADVANCED METHODS OF NEUTRON SCATTERING [ENTWICKLUNG UND ANWENDUNG VON FORTGESCHRITTENEN METHODEN DER NEU-

TRONENSTREUUNG] c72
W. Glaeser *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 201-210 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

Advanced neutron scattering apparatus and methods were developed and utilized. A high resolution neutron-gravity-spectrometer for ultracold neutrons and a triple axis spectrometer with focusing crystals and space sensitive detector are discussed. The development of a pseudostatic time of flight spectrometer for small impulse transfers was started. For a number of nuclei the scattering lengths are precisely determined using the methods of gravity refractometry and Christiansen filters. For applications on ultracold neutrons, besides the high resolution spectroscopy, mainly neutron optics studies including the development magnifying imaging systems are preferred. The high resolution time of flight diffractometer was used to investigate superstructures and ordering phenomena, and to determine lattice constants. Temperature and pressure dependence of the static structure factor of liquid rubidium are determined. Author (ESA)

N85-12711# Johann-Wolfgang-Goethe-Univ., Frankfurt am Main (West Germany).
NEUTRON SCATTERING ON STRUCTURAL PHASE TRANSITIONS WITH DOMAIN BUILDING [NEUTRONENSTREUUNG BEI STRUKTUREILEN PHASENUEBERGAENGEN MIT DOMAENEN-BILDUNG]
M. Muellner, H. Tietze, and H. Jex *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 211-221 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

Dynamic anomalies (e.g., critical fluctuations, precursor effects) and temperature and pressure dependent magnetic domain distributions were investigated on the ferrodistortive phase transitions of the isotypes perovskite RbCaF3, KMnF3 and LaAlO3. Neutron and X-ray scattering were used on powder and single crystal samples. Results are obtained for the following topics: lattice constants splitting; constancy of the cell volume; binding lengths; symmetry and rigidity of the anion octahedron; ordering parameters; fluctuations of ordering parameters; anomaly of the vibration amplitudes; temperature dependent domain distribution; temperature hysteresis; effects of the biaxial pressure on domains, unidomains and pressure hysteresis; precursor effects; pressure dependence of the central component and generalized algorithm for the determination of domain distributions.
Author (ESA)

N85-12712# Muenster Univ. (West Germany).
GROWTH AND MAGNETIC INVESTIGATIONS OF SINGLE CRYSTALS OF INTERMETALLIC COMPOUNDS OF RARE EARTHS AND URANIUM [HERSTELLUNG UND MAGNETISCHE UNTERSUCHUNG VON EINKRISTALLEN INTERMETALLISCHER VERBINDUNGEN DER SELTENEN ERDEN UND DES URANSS]
H. G. Purwins *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 222-232 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

Magnetic properties of rare Earth and uranium compounds were studied. Magnetic excitations property were investigated on Dy Al2-and HoAl2-single crystals using inelastic scattering of thermal neutrons. As most significant static properties, magnetization and magnetocrystalline anisotropy were measured on PtAl2-, NdAl2-, and HoAl2- single crystals using a SQUID magnetometer. Single crystals of DyAl2, HoAl2, and Pt Pd3 are produced following the Czochralski method. A unified atomic description of magnetic excitations, magnetization, and magnetocrystalline anisotropy is given. A systematic behavior of the magnetic properties of the (rare Earth) Al2 compounds is observed. The results represent an important step towards the systematic understanding of materials with local magnetic moments. Author (ESA)

N85-12713# Technische Hochschule, Aachen (West Germany).
PHASE TRANSFORMATIONS OF AlPO4 WITH SiO2 STRUCTURES [PHASENUMWANDLUNGEN VON AlPO4 MIT SiO2 STRUKTUREN]
J. Bethke, W. Brueggemann, H. Arnold, G. Eckold, G. Heger, M. Muellner, and A. Wright *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 233-239 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

Phase transformations of AlPO4 with structures similar to SiO2 were investigated. The high temperature phase on AlPO4-quartz (Berlinite) was studied with a view to a twinning of the deep phase. The phonons were measured at room temperature. The phase transformation of AlPO4-quartz at 846K is deduced from the lattice dynamics. The structures of SiO2 and AlPO4 cristobalite were investigated using powder diffractometers. For SiO2 the resolution of the apparatus was not good enough for an exact structure determination. For AlPO4, cristobalite measurements at room temperature confirm the known structure; at high temperatures the cristobalite structure shows that the large Al atoms apparently walk out of the tetrahedron places in the large structure. The structure of FeIO4 quartz is determined.
Author (ESA)

N85-12714# Wuerzburg Univ. (West Germany).
INELASTIC NEUTRON SCATTERING ON CRYSTALS FOR THE CLARIFICATION OF STRUCTURE AND SEMICONDUCTOR PROPERTIES [INELASTISCHE NEUTRONENSTREUUNG AN KRISTALLEN ZUR KLAERUNG VON STRUKTUR- UND HALBLEITEREIGENSCHAFTEN]
R. Geick *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 240-252 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

Questions in solid physics concerning structural, magnetic, and semiconductor properties of crystals were studied with neutron scattering. The following problems were investigated and are fully or partially clarified: lattice instabilities and phase transitions in fluoride perovskites taking example by KMnF3/KZnF3; lattice dynamics of ZnF6 octahedrons in several crystal environments, in cubic KZnF3 and in tetragonal K2ZnF4 with layer structure; magnetic properties (phases, structures, correlations, and excitations) of the mixed crystal system Rb2MnxCr1-xCl4, whose final partner is the ferromagnet Rb2CrCl4 and whose other antiferromagnet is Rb2MnCl4; lattice dynamics and bonding relations in the semiconductor Bi2Te3 with sandwich structure, and electron-phonon coupling in ClF3. Author (ESA)

N85-12715# Technische Hochschule, Aachen (West Germany).
CONSTRUCTION, PUTTING INTO OPERATION, AND UTILIZATION OF A TRIPLE AXIS NEUTRON SPECTROMETER Final Report, 1980-1982 [BAU, INBETRIEBNAHME UND NUTZUNG DES DREIACHSEN-NEUTRONEN-SPEKTROMETERS (UNIDAS)] c35
R. Baldauf, G. Eckold, Th. Hahn, B. O. Hildmann, H. Mitlacher, and H. J. Weber *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 253-268 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

The triple axis neutron spectrometer UNIDAS was constructed, put into operation, and tested. The peripheral equipment was extended and the control and evaluation program was further developed. Experiments on 15 different subjects were performed. Their research projects dealt with the dynamics of defects-ordered systems. In the superionic-conductor mixed crystal phase Ag 0.85 Cu 0.15 Br, low energy excitation is observed. In the defects-ordered phase of KLiSO4, an anomalous dispersion curve is observed which can correspond to an additional degree of freedom; the phase transformation of the monocline low temperate phase was investigated. The defects ordering in CsLiO4 at room temperature is demonstrated by a neutron structure study; the

SO4-tetrahedron can take two orientations with equal rights (split model). Author (ESA)

N85-12716# Muenster Univ. (West Germany).
MEASUREMENTS ON THE TRIPLE AXIS SPECTROMETER UNIDAS FOR THE INVESTIGATION OF DYNAMIC PROCESSES IN CRYSTALS USING INELASTIC NEUTRON SCATTERING [MESSUNGEN AM DREIACHSENSPEKTROMETER UNIDAS ZUR UNTERSUCHUNG DYNAMISCHER PROZESSE IN KRISTALLEN MIT HILFE INELASTISCHER NEUTRONENSTREUUNG]
H. Bernotat-Wulf, H. Boehm, W. Hoffman, H. Grimm, G. Heger, N. Lehner, W. Press, and B. Renker *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 269-279 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

The motion of Li ions in the one-dimensional ionic conductor beta eucryptite (LiAlSiO4) was investigated. The Li-diffusion in the structure channels of the one-dimensional ionic conductor was characterized by measurements with elastically and quasielastically scattered neutrons. It is shown that the Li-diffusion in the channel direction occurs cooperatively over several Li distances, while in the perpendicular direction the correlation between the channels is weaker. The ion motion in correlation with the phase transformation was investigated by inelastic neutron scattering. The counting rates were not sufficient for secure predictions due to the small crystal size. The weakly recognizable branch of the lowest mode of the vibration spectrum is related to a switching of the tetrahedron chains and hence to the searched phase transformation mechanism. Author (ESA)

N85-12717# Technische Univ., Hamburg (West Germany).
MAGNETIC INTERACTION IN LOW-DIMENSIONAL SYSTEMS [MAGNETISCHE WECHSELWIRKUNGEN IN NIEDERDIMENSIONALEN SYSTEMEN]
W. Gunsser, A. Wiedenmann (Centre d'Etudes Nucleaires, Grenoble, France), R. Priess, M. Sont, E. F. Bertaut, J. Rossat-Mignod (Centre d'Etudes Nucleaires, Grenoble, France), P. Burlet (Centre d'Etudes Nucleaires, Grenoble, France), O. Evrard (Centre d'Etudes Nucleaires, Grenoble, France), J. P. Venieu (Nancy Univ., France), and R. Brec (Nantes Univ., France) *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 280-292 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

Magnetic interactions were studied using neutron scattering experiments, Mossbauer investigations, and susceptibility and magnetization measurements. In the quasi 1D-system, FeMgBO4 with partial disordering of the metal ions a spin-glass behavior is observed in the static and dynamic properties which are based on the competition between two antiferromagnetic couplings. The quasi 2D close ordering, the phase transformations 2D to 3D and the magnetic structures in compounds with honeycomb structures of the group MPX3 (M two times ionized = Mn, Fe, Co, Ni; and X = S, Se) are determined by three dominant coupling constants. In compounds with double layer structures, a 2D-behavior in VOCl and LuM (two times ionized) Fe (three times ionized) O4 (M two times ionized = Mn, Fe), and 2D-spin-glass properties in LuMgFeO4 are revealed as a consequence of competing interactions. Phase transitions and critical phenomena were studied on the isotropic layer-structure compound FeI2 and on the graphite one-layer compound LiC6. Author (ESA)

N85-12718# Konstanz Univ. (West Germany). Fakultaet fuer Physik.
PHONON ANOMALIES IN SUPERCONDUCTING TRANSITION METAL COMPOUNDS [PHONOANOMALIEN IN SUPRALEITENDEN UEBERGANGSMETALLVERBINDUNGEN]
P. Roedhammer, W. Reichardt (Kernforschungszentrum, Karlsruhe, West Germany), and H. Boemmel *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 293-299 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

The lattice dynamics of the superconducting transition metal compounds LaS and NbO were investigated. The phonon dispersion was measured using inelastic scattering on a triple axis spectrometer. The phonon state layer of NbO is determined by time of flight measurements. The measurement results are well approximated by model calculations (scale model and double scale model). In LaS anomalies the longitudinal-acoustic branches characteristic of all superconducting hard materials are found. No anomalies occur in the tranversal branches of LaS and YS. The phonon spectrum of NbO cannot directly be compared to that of the hard materials with NaCl-structure due to the superstructure of the lattice vacancies. Model calculation nevertheless show a remarkable qualitative agreement between the acoustic branches of NbO and those of NbN0.83 and VN0.86. This is important for the discussion of the correlation between high temperature superconductivity and phonon anomalies in hard materials.
Author (ESA)

N85-12719# Technische Univ., Hanover (West Germany).
QUASIELASTIC NEUTRON SCATTERING ON SINGLE CRYSTALS OF SOLID IONIC CONDUCTOR [QUASIELASTISCHE NEUTRONENSTREUUNG AN EINKRISTALLEN FESTER IONENLEITER]
Klaus Funke, Andreas Hoech, and Joerg-Peter Ewald *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 300-311 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

Quasi-elastic scattering of cold neutrons on single crystals of the high temperature phases of AgI and Ag2Se were investigated. Spectra were registered at 250 C under several crystal orientations. The central quasi-elastic component of these spectra is explained with simple hopping diffusion models. It is compatible with a continuous model which describes the diffusion of highly mobile silver ions in a 100 channel system. Data reduction and evaluation of experimental data concerning quasielastic neutron scattering on a large single crystal of alpha-AgI were performed. The spectra demonstrate that the silver ions carry out hopping diffusion over tetrahedron vacancies. Author (ESA)

N85-12720# Technische Univ., Hanover (West Germany). Inst. fuer Theoretische Physik.
INVESTIGATIONS ON LOW-DIMENSIONAL SOLID STATE SUBSTANCES [UNTERSUCHUNGEN AN NIEDERDIMENSIONALEN FESTKOERPERN]
H. J. Mikeska, H. U. Everts, H. Schulz, E. Allroth, W. Apel, C. Etrich, N. Flueggen, W. Kock, K. Osano, and E. Patzak *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 312-323 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

Theoretical investigations were carried out on low-dimensional solid state substances in order to complete neutron scattering experiments and to help in the planning of further experiments. Nonlinear excitations, especially the investigation of solitons in the one-dimensional ferromagnet CsNiF3 in the external magnetic field, were emphasized. Solitons in CsNiF3 can be treated as elementary excitations and can be determined by a central peak in the dynamic structure factor. The significance the interaction of elementary excitations, the magnet's quantum nature, the strength of the single-ion anisotropy, and the coupling between neighboring chains for soliton-like excitations were studied. The results confirm the observation of solitons in CsNiF3 in neutron scattering experiments. The dynamics of the classical Heisenberg chain with impurities and one-dimensional conductor were also studied.
Author (ESA)

N85-12721# Bochum Univ. (West Germany).
STRUCTURAL PHASE TRANSITIONS IN DOPED HEXAHALOGEN METALLATES [STRUKTURELLE PHASENUEBERGAENGE IN DOTIERTEN HEXAHALOGENOMETALLATEN]
J. Petzl, V. Waschk, N. Wruk, and O. W. Floerke *In* Kernforschung-

sanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 324-332 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

Phase transition temperatures and phonon spectra were investigated in a large number of mixed crystals as a function of composition and temperature, respectively. Polycrystals and single-crystalline samples were grown with the developed crystal breeding method. Several complementary experimental methods including Raman and neutron scattering, nuclear quadrupole and electron paramagnetic resonance were used for the physical characterization. The most important scientific result is the systematics in the dependence of the transition temperature on the concentration. The measured evolution can be reproduced in the framework of a simple model based on a synthesis of the Landau theory and the virtual crystal. Author (ESA)

N85-12722# Technische Univ., Munich (West Germany).
CONSTRUCTION OF A COLD NEUTRON SOURCE AT FRM, MUNICH Status Report [BAU EINER KALTEN NEUTRONENQUELLE AM FRM MUENCHEN] **c72**
E. Kraehling and W. Glaeser *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., Mar. 1984 p 333-346 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

The construction of a cold neutron source was started. The aim is to significantly increase the neutron flux in the wavelength range above 3A. An increase by a factor 10 to 20 is expected. The basic function of such a source is given. The construction is explained from neutron physics and experimental viewpoints. The setup is technically described. Operation and security concepts are presented. The status of the construction is given. The further course of the projects is described. Author (ESA)

N85-12723# Johann-Wolfgang-Goethe-Univ., Frankfurt am Main (West Germany).
CONSTRUCTION OF A NEUTRON SINGLE CRYSTAL DIFFRACTOMETER [BAU EINES NEUTRONENEINKRISTALLDIFFRAKTOMETERS]
H. Bartl *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 347-353 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

The construction of an X-ray supported measuring and evaluation system for neutron scattering experiments on single crystals was continued. The following devices were installed or finished: a shielding with retractable monochromator goniometers two heavy neutron spectrometers two Euler circle goniometers with sample cooling two programmable diffractometer controls for automatic operation, and an automatic four-circle X-ray diffractometer coupled to a structure evaluation system. Author (ESA)

N85-12724# Technische Univ., Munich (West Germany).
INVESTIGATION OF SPECIAL FACILITIES FOR A SPALLATION NEUTRON SOURCE [UNTERSUCHUNG VON SONDEREINRICHTUNGEN FUER EINE SPALLATIONS-NEUTRONENQUELLE] **c72**
K. Boening, W. Glaeser, R. Golub, H. Weber, and W. Glaeser *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 354-363 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

The design of three low temperature special research facilities for the German project of an intense spallation neutron source (SNQ) is presented and discussed. A cold source operated with 301 liquid D2 is characterized by nuclear heat production of 13 kW which can be reduced to 9 kW using undercooled D2. A realistic test experiment for the cold source is prepared. With an ultracold source on SNQ ultracold neutrons (UCN) saturation densities as high as 4 times 10 to the fifth power UCN/cu cm can be reached in the case of the superthermal source construction method, compared to 3 times 10 to the third power for a Doppler shift source and 1 for presently available sources. A low temperature irradiation facility was designed with which samples can be irradiated with thermal or fast neutrons. The main advantage of SNQ as compared to a reactor is the ten times lower gamma radiation; the main disadvantage is its time structure. Author (ESA)

N85-12725# Erlangen-Nuremberg Univ. (West Germany).
CALCULATION OF THE SCATTERING FUNCTION OF ROTATING MOLECULES WITH EMPHASIS ON THE TUNNEL SPECTRA OF ABSORBED MOLECULES [BERECHNUNG DER STREUFUNKTION VON ROTIERENDEN MOLEKUELEN MIT SCHWERPUNKT AUF DEN TUNNELSPEKTREN ADSORBIERTER MOLEKUELE]
Alfred Hueller, Martin Smalley, Wolfgang Mueller, and Christian Esser *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 364-370 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

The rotational states of tetrahedron molecules in highly symmetric potentials were calculated using the pocket state formalism. The potential parameters are determined from the experimental values for libration excitations and tunnel frequencies. For solid methane, a mixed development with local and free states was used; with which the difficulties in previous calculations can be explained. The calculation of transition matrix elements for neutron scattering allows the use of the intensities for the interpretation of cases with reduced symmetry. Author (ESA)

N85-12726# Marburg Univ. (West Germany).
INVESTIGATION OF INTERNAL FIELDS AND MOTIONS, RADIATION DAMAGES AND RECOVERY PROCESSES USING BETA AND GAMMA ACTIVE PROBE NUCLEI [UNTERSUCHUNGEN INNERER FELDER UND BEWEGUNGEN, STRAHLENSCHAEDEN UND GAMMA-AKTIVER SONDENKERNE]
H. Ackermann, B. Bader, K. Buerkmann, W. Buttler, K. Doerr, P. Freilaender, E. Goerlach, H. Grupp, P. Heitjans, E. Jaeger et al *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 371-384 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

Solid state physics experiments were conducted on systems belonging to different substance classes. Polarized radioactive probe nuclei were obtained in sample material by activation with spin-polarized thermal reactor neutrons. The decay radiation allows for the determination of nuclear resonance signals as well as die-away curves of the nucleus polarization by spin-lattice relaxation processes. The method was applied to ionic crystals, semiconductors, glasses, and metal melts. Dynamics and structure of intrinsics, radiation and doping effects, self diffusion and electronic properties are determined. Author (ESA)

N85-12727# Stuttgart Univ. (West Germany).
LATTICE DEFECTS IN BODY CENTERED CUBIC TRANSITION METALS Final Report [GITTERFEHLSTELLEN IN KUBISCH-RAUMZENTRIERTEN UEBERGANGSMETALLEN]
H. Schultz, H. Kugler, I. A. Schwirtlich, J. Petzold, U. Ziebart, and M. Tietze *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 385-393 refs In GERMAN (For primary document see N85-12696 03-76)
(Contract BMFT-03-41-FO2-P/1)
Avail: NTIS HC A99/MF A01

Characteristic data for vacancies and interstitial atoms were investigated on the transition metals Nb, Ta, Mo, W, and Fe. The data were deduced from measurements of the electrical resistance after electron irradiation or quenching. The measurements were conducted on pure and carefully directed doped samples. Activation enthalpy for the migration of vacancies and the formation of interstitial atoms, and self diffusion activation energy are determined. Author (ESA)

N85-12728# Technische Univ., Munich (West Germany). Physik-Dept. E 15.
ELECTRONIC STRUCTURE AND LATTICE DYNAMICS OF SOLID STATE SUBSTANCES FROM GAMMA NUCLEAR RESON-

ANCE ABSORPTION AND ANGULAR CORRELATION MEASUREMENTS Final Report [ELEKTRONENSTRUKTUR UND GITTERDYNAMIK VON FESTKOERPERN AUS GAMMA-KERNRESONANZABSORPTIONS- UND WINKELKORRELATIONSMESSUNGEN]

G. M. Kalvius, R. L. Mossbauer, and F. E. Wagner *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 394-411 refs In GERMAN (For primary document see N85-12696 03-76)

Avail: NTIS HC A99/MF A01

Static and dynamic properties of the electronic states in crystalline and amorphous solid state substances were investigated by hyperfine spectroscopy. Short lived and highly active nuclides were used for the study. Hydrogen-induced distortion of the host lattice in metal-hydrogen systems is found. Conformation transitions in polymers and biomolecules are observed. The suppression of incoherent channels in nuclear resonance on perfect single crystals is experimentally confirmed. The electron ground state and retardation of the spin-flip-rate in amorphous magnetic rare Earth compounds are determined. The existence of paramagnetic spin correlation far above the magnetic transition temperature is found. Characteristics of the spin dynamics in frustrated spin glasses are determined. The transfer of oxide clusters in the sputtering of iron and rare Earth mixed oxides and their influence on the magnetic behavior are found. The electron transfer behavior in a Hume-Rothery alloy system (Zn/Cu) is determined. The spatial motion of atoms is observed by means of the Lamb-Mossbauer factor. Author (ESA)

N85-12729# Erlangen-Nuremberg Univ. (West Germany).

INVESTIGATION OF SOLID STATE PROBLEMS USING THE HYPERFINE INTERACTION BETWEEN STATIC AND DYNAMIC INTERNAL FIELDS WITH SHORT LIVE EXCITED PROBE NUCLEI [UNTERSUCHUNG VON FESTKOERPERPROBLEMEN UEBER DIE HYPERFEINWECHSELWIRKUNG ZWISCHEN STATISCHEN UND DYNAMISCHEN INNEREN FELDERN MIT KURZLEBIGEN ANGEREGTEN SONDENKERNEN]

J. Christiansen and Wolfgang Witthuhn *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 412-425 refs In GERMAN (For primary document see N85-12696 03-76)

Avail: NTIS HC A99/MF A01

Radiation damage and electric field gradients in solid state materials were investigated. The local structure and formation, and recovery mechanisms of radiation damage in metals were studied. The emphasis was on extended defect cascades due to high energetic heavy ions and on atomic defects in Zn and Cd. In-beam measurements on Zn and Cd show a trapping of thermally activated defect from the cascades volume. Perturbed angular correlations measurements on Cd and Zn show several defined defect-specific field gradients. Electric field gradients (EFG) were investigated in noncubic metals, alloys, and semiconductors, with emphasis on the precise measurement of the temperature dependence in Sn at low temperatures, whereby the impurity systems 120SbSn and 111CdSn were precisely verified. The dynamics is independent of the chosen impurity. Differences are due to differences in local EFG of the probe atom. In the semiconductor compound In2Te5 the temperature dependence of the EFG on a Cd-impurity implanted in a In-place is determined in the total domain of extrinsic conductivity, and quantitatively explained. Author (ESA)

N85-12730# Erlangen-Nuremberg Univ. (West Germany).

MEASUREMENT OF STATE AND DYNAMIC SOLID STATE PROPERTIES IN NONMETALS USING EXCITED PROBE NUCLEI ON THE ERLANGER 12 MeV TANDEM ACCELERATOR [MESSUNG STATISCHER UND DYNAMISCHER FESTKOERPEREIGENSCHAFTEN IN NICHTMETALLEN MIT HILFE ANGEREGTER SONDENKERNE AM ERLANGER 12 MeV-TANDEMBESCHLEUNIGER]

W. Kreische, H. Niedrig, H. Hohenstein, H. Barfuss, G. Boehnlein, G. Gradl, A. Reimer, F. Gubitz, and B. Roeseler *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 426-441 refs In GERMAN (For primary document see N85-12696 03-76)

Avail: NTIS HC A99/MF A01

Electric field gradients were measured in several fluoro compounds, semimetals and semiconductors. The investigations cover simply built covalent molecules as F2, HF or CF4, ionic fluoro compounds of the rare earths (RE) and identification of defects in CaF2 and SrF2 using mixed crystals of the type CaF2/REF3 and SrF2/REF3. In all cases simple models lead to a satisfactory description of the results. The values for F2 and CF4 are confirmed by theoretical predictions. The investigation of the temperature and concentration dependence of the electric field gradients was made in Sb1-xMx (M = In, Cd, Sn, Ag) semiconductors. Among the semiconductors mainly these compounds were searched which contain the mother activity. In as a natural component; InTe, In2Te3, In2Te5, InSe, and In2Se3 belong to them. Though very different temperature dependences are found, it nevertheless appears that they can be put into a consistent picture by comparison with solid state properties, as e.g., the mobility of the charge carriers. The semimetal results can possibly also be interpreted in this way. Author (ESA)

N85-12731# Konstanz Univ. (West Germany). Fakultaet fuer Physik.

SOLID STATE INVESTIGATIONS WITH NUCLEAR PHYSICS METHODS [FESTKOERPERUNTERSUCHUNGEN MIT KERNPHYSIKALISCHEN METHODEN]

M. Deicher, G. Gruebel, H. Hofsaess, G. Lindner, R. Minde, R. Peichl, E. Recknagel, A. Weidinger, and Th. Wichert *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 442-456 refs In GERMAN (For primary document see N85-12696 03-76)

Avail: NTIS HC A99/MF A01

Defects in metals were investigated using the perturbed gamma-gamma angular correlation method. Radioactive probe atoms were put in several metals by implantation, melting or diffusion; they serve as detectors for the mobility of interstitial atoms, vacancies and their clusters via the nuclear quadrupole interaction. The strength of the interaction, the orientation with respect to probe atoms and host lattice, and damage rate experiments give information about the nature of the defects. The defects were obtained by electron and ion irradiation, and by quenching. Methods as the defect-antidefect reactions to determine interstitial atoms in gold, and the combination of conversion-electron channeling and perturbed angular correlation for the sensitive localization of strange atoms in the presence of vacancies are developed. Microscopic observation of diffusion processes in tantalum shows the elementary diffusion jump of oxygen. The diffusion of helium in some metals, especially steel, is determined. Author (ESA)

N85-12732# Wuerzburg Univ. (West Germany). Inst. fuer Physik.

NEUTRON IRRADIATION OF SEMICONDUCTORS [NEUTRONENBESTRAHLUNG VON HALBLEITERN]

W. Ossau, U. Steigenberger, G. Landewehr, K. Elliott, and Pu Lin Liu *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 458-467 refs In GERMAN (For primary document see N85-12696 03-76)

Avail: NTIS HC A99/MF A01

Electron irradiated GaAs-and Si-crystals were investigated to identify lattice defects, as a preparation for experiments on neutron irradiated Si and GaAs. The defects occurring after electron irradiation (E = 2MeV) are easier to analyze than after neutron irradiation. Moreover, beta emission from neutron transmutated GaAs and Si show effects which are very similar to the case of electron irradiation. Using magnetoluminescence in fields up to 10 Tesla it is shown that the defect in Si is very probably a Ga-interstitial atom with a substitutional vacancy from Ga. Electron irradiated GaAs-epitaxy samples at room temperature show several new low temperature luminescence lines after annealing. Experiments with strong magnetic fields show that carbon acts as acceptor, independently of the samples' doping. This result is

relevant for potential applications of GaAs-field effect transistors under space conditions. A line at 1.44 eV due to a excitonic transition is found, and it is demonstrated that the existing interpretations are wrong. Author (ESA)

N85-12733# Erlangen-Nuremberg Univ. (West Germany).
UTILIZATION OF A TANDEM ACCELERATOR FOR THE INVESTIGATION OF SOLID STATE PROPERTIES BY MEANS OF HEAVY IONS [ANWENDUNG EINES TANDEMBESCHLEUNIGERS ZUR UNTERSUCHUNG VON FESTKOERPEREIGENSCHAFTEN MITTELS SCHWERIONEN]
F. Saemann-Ischenko, H. Adrian, R. Behrle, J. Bieger, F. Boemmel, K. Brenner, U. Hagen, G. Hertel, M. Kerling, R. Knauf et al *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 468-483 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

Four superconducting material classes were investigated, with emphasis on the atomic structure microscopic causes of their unusual properties. Irradiation experiments with 20MeV S-ions at lower temperature were conducted. The A15-compounds show a systematic change of the electronic state densities due to defects, similar to effects due to the implantation of hydrogen. The chevrel compounds show an extreme sensitivity to defects due to the pronounced cluster character of the structure. It is demonstrated that low temperature irradiation can also change the microscopic structure of amorphous alloys due to a reduction of the topological ordering. In irradiated ternary rhodium bromide the exchange interaction between rhodium-d-electrons and the magnetic 4-f-electrons reduces the highest critical temperature and magnetic field and is responsible for the indirect interaction between magnetic moments. The excitation and relaxation of the electronic system of solid state materials during interaction with fast ions was investigated with induced Auger transitions spectroscopy, resulting in a first understanding of the significance of the chemical environment in these phenomena. Author (ESA)

N85-12734# Goettingen Univ. (West Germany). Inst. fuer Metallphysik.
RADIATION INDUCED DEFECTS IN SUPERCONDUCTORS OF TYPE 2 [BESTRAHLUNGSINDUZIERTE DEFEKTE IN SUPRALEITERN ZWEITER ART]
Herbert C. Freyhardt, Volker Graeger, Hans-Ulrich Krebs, Juergen Reichelt, Herbert Wagner, and Joachim Wecker *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 484-495 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

The electrical conductivity of superconductors of the second type was investigated by the micromechanics of pinning of the flux filament lattice. The central question in the understanding of the flux pinning phenomena, namely the so-called simulation problem, was studied and answered on a model system of blisters and pores produced by high temperature ion irradiation of crystalline niobium. The radiation induced formation of blisters and the effect on ion irradiation on the structure, the topological and chemical ordering, and the reversible and irreversible properties of noncrystalline type II-superconductors are determined on Mo and Zr alloys. Author (ESA)

N85-12735# Technische Univ., Munich (West Germany).
DETERMINATION OF DEPTH PROFILES AND LATTICE POSITIONS WITH (N, P)- AND (N, ALPHA) REACTIONS (N, ALPHA) AND CHANNELING-BLOCKING METHOD) [BESTIMMUNG VON TIEFENPROFILEN UND GITTERPOSITIONEN MIT (N, P)- UND (N, ALPHA)-REAKTIONEN (N, ALPHA)- UND CHANNELING-BLOCKING-METHODE]
R. Henkelmann, H. Grimm, F. Jahnel, F. Ott, S. Schlosser, J. P. Biersack (HMI, Berlin), D. Fink (HMI, Berlin), K. Tjan (HMI, Berlin), K. Haberger (IFT, Munich), and H. Ryssel (IFT, Munich) *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 496-508 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

Range distributions of ion implated 3He and 6Li were investigated in about 30 elements (metals from Be to Pb, some steels), nonmetallic and organic materials (S, C, carbon compounds, etc.) using the (n, p) and (n, alpha) method. Oscillations of the average projected range due to the electron shell structure of the target atoms in dependence on the target atomic number are observed. Deviations from regular range profiles occur in some samples due to surface deformations, high sputtering rates, fast diffusion, and radiation induced diffusion. The thermal behavior of samples implanted with 3He, 6Li and 10B is determined in steps of 50 deg C. The recovery behavior determined from the profile-target combination and the implantation doses can in the different concentration domains be explained by the formation of, e.g., helium-vacancies-clusters. The experimentally determined range profiles of Boron-10 in metals compared to theoretically simulated depth profiles confirm the existing calculation formalisms (e.g., TRIM). The results provided conclusions concerning the physical suppositions and the approximations in calculations. Author (ESA)

N85-12736# Technische Univ., Munich (West Germany).
MOSSBAUER SPECTROSCOPIC INVESTIGATIONS OF THE DIFFUSION AND CORRELATION OF LATTICE DEFECTS (COMPLEMENTARY TO NEUTRON SPECTROSCOPIC INVESTIGATIONS) [MOESSBAUERSPEKTROSKOPISCHE UNTERSUCHUNGEN DER DIFFUSION UND KORRELATION VON GITTERDEFEKTEN (IN ERGAENZUNG ZU NEUTRONENSPEKTROSKOPISCHEN UNTERSUCHUNGEN)]
R. Raab, H. Wipf, J. Voelkl, G. Roth, U. Potzel, and G. Alefeld *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 509-522 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

The diffusion and correlation of H interstitial atoms in Ta were investigated in the range of very high H concentrations. Mossbauer absorption measurements and complementary Gorsky-effect and neutron scattering experiments were conducted. These complementary experimental techniques provide the H-concentration fluctuations for different ranges. The results in the domain of low H-concentrations can well be explained by existing theories. A satisfactory description of the enhanced short-range H-H interaction effects at higher H-concentrations is impossible in the framework of these theories. Author (ESA)

N85-12737# Freie Univ., Berlin (West Germany).
INVESTIGATION OF THE INTERACTION OF ATOMS WITH LATTICE DEFECTS USING PROBE METHODS [UNTERSUCHUNG DER WECHSELWIRKUNG VON FREMDATOMEN MIT GITTERDEFEKTEN MIT HILFE VON SONDENATOMEN]
M. Bruessler, V. Groeger, K. Ecker, W. Petry, J. Sakamoto, K. Sassa, R. Stehr, and G. Vogl *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 523-538 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

The physics of atomic vacancies were investigated using Mossbauer spectroscopy, perturbed gamma-gamma angular correlation and the backscattering of protons (channeling). Trapped interstitial atoms in the diluted alloy AgFe displace the Fe-atom in an interstitial cage which contributes essentially to radiation induced diffusion. The combination of alloy formation by ion implantation, defect production by particle radiation, and channeling measurements shows that interstitial atoms in Mo are trapped by Co strange atoms and form <110> dump-bells. The investigation of point defects shows that after cold working of Al and Ag no freely moving interstitial atoms are found. The anomalously fast diffusion of impurity atoms was investigated in the polycrystalline ZrFe by quasielastic Mossbauer spectroscopy, and in ZrCo by quasielastic incoherent neutron scattering. It is found that all Fe and Co atoms respectively, take part in the diffusion process. The evolution of the diffusion is divided in at least two jump mechanisms with strongly different jump probabilities. Author (ESA)

N85-12738# Bayreuth Univ. (West Germany).
SPUTTERING OF GOLD IRRADIATED WITH THERMAL NEUTRONS [SPUTTERING VON GOLD BEI BESTRAHLUNG MIT THERMISCHEN NEUTRONEN] **c26**
J. Kalus, P. Hurych, and J. Selbach *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 540-543 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

The sputtering of neutron irradiated gold was theoretically and experimentally investigated in an ultrahigh vacuum apparatus. Thermal neutrons are trapped by gold atoms; the compound nucleus decays with emission of a gamma-gamma cascade. The gold atom receives a recoil energy with a nearly delta-shaped energy distribution at 115 eV. Gold atoms sitting on the first or second surface layer of a foil can be sputtered into the vacuum. They are radioactive with a half life of 2.7 days, and are observed by the analysis of characteristic decay gamma quanta. Computer simulations of the recoil atom orbits were made in order to explain the tests. Author (ESA)

N85-12739# Technische Univ., Munich (West Germany).
INVESTIGATION OF THE PRODUCTION AND PROPERTIES OF LATTICE DEFECTS INDUCED BY LOW TEMPERATURE REACTOR IRRADIATION [UNTERSUCHUNG VON PRODUKTION UND EIGENSCHAFTEN DER DURCH TIEFTEMPERATUR: A REAKTORBESTRAHLUNG ERZEUGTEN GITT ERFEHLER]
W. Mansel, P. Mueller, J. Marangos, D Wahl, G. Wallner, W. Weck, R. Riem, and W. Glaeser *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 544-554 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

Defects in irradiated metals were investigated. In the project defect production rate neutron spectra in the irradiated position of a low temperature irradiation stand are determined using the multiple probe activation method. In the project Mossbauer spectroscopy the trapping of interstitial atoms on 57C-impurity atoms in W and V is observed. It is found that in W interstitial atoms are mobile at 25 K. For Mo57Co a detailed understanding of the reactions between impurity and interstitial atoms is obtained. In the project alkali metals the mobility of interstitial atoms in K, Na and Li at 5K is demonstrated by resistivity measurements; step III lies at 16K. The investigations of the magnetic resistance on irradiated or worked K show that the macroscopic, residual defect systems in the samples are responsible for the anomalous linear evolution of the longitudinal high field magnetic resistance. In the project Fermi surfaces of Bi with lattice defects de Haas-van Alphen effect measurements on irradiated Bi show an increase up to 100% of the Fermi surface cross sections of the electron ellipsoid and a simultaneous decrease of the vacancies Fermi surface cross sections. Author (ESA)

N85-12740# Technische Univ., Munich (West Germany).
FAST IONS AS PROBES IN SOLID STATE RESEARCH [SCHNELLE IONEN ALS SONDEN IN DER FESTKOERPERFORSCHUNG]
R. Sizmann *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 555-570 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

Inelastic interactions of fast ions with solid state materials, static location determination of impurities, and defects were investigated. The ion lattice control method was used to determine impurity atom distortion fields (in the tantalum-hydrogen system) and to investigate the plastic deformation of thin epitaxial film (Cu on NaCl crack surfaces). This method is further developed to determine surface defects (reconstruction of Mi(110)) and to localize impurity atoms on surfaces by means of nuclear reactions (hydrogen on Ni(111)), ion induced Auger electron spectroscopy (oxygen on Ni(110)), and radiation emission of scattered ions (oxygen on NiFe(110)). Spin spectroscopy, energy loss, electron capture, pair capture of polarized electrons, optical excitation, and optical polarization provide completing statements concerning the essential problems of the inelastic interactions between fast ions and solid state materials. This knowledge is important for the interpretation of location determination and for statements concerning, e.g., the magnetic properties of thin surface layers. Author (ESA)

N85-12741# Technische Univ., Munich (West Germany).
X-RAY AND NEUTRON SCATTERING AND X-RAY SPECTROSCOPY FOR THE STUDY OF DEFECTS IN SOLID STATE MATERIALS [DIFFUSE ROENTGEN- UND NEUTRONEN STREUUNG ZUR UNTERSUCHUNG VON DEFEKTEN UND DEFEKTKORRELATIONEN IN BESTRAHLTEN UND DOTIERTEN FESTKOERPERN]
E. Burkel, H. Behr, T. Bolze, H. Dosch, W. Eisele, W. Fenzl, D. Grasse, O. Kocar, W. Mayer, H. Metzer et al *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 571-588 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

Diffuse X-ray and neutron scattering were used to investigate defects and defects correlation in irradiated and doped solid state materials. Si, MgO and quartz were investigated after irradiation in a reactor at moderator temperature. After irradiation of Cu at 4.6K a correlation of the interstitial atoms in subcascades is observed. After electron irradiation of diluted Al(Ag)-alloys the interaction between defects and impurities was studied. The investigations on diluted Pb(Au)-alloys results in statements about the agglomeration degree of the Au-atom. For the interstitial alloy NbNx the force dipole tensor is determined and for point defects Stokes-Wilson scattering is observed and a concept for its description is given. The trapping of H and N was studied on the system NbNxHy. Neutron interreflex scattering clarify the local defect structure of D in Nb. Concentration and temperature dependence of diffuse scattering are determined on NbHx(Dx) and Nb-yMoyHx(Dx). Microscopic density fluctuations are observed and their spinodal temperature determined. The lowering of phase boundary and spinodal temperature with increasing Mo-concentration is explained by a lattice gas model with fluctuating field. Author (ESA)

N85-12742# Technische Univ., Munich (West Germany). Dept. of Physics.
SPECTROSCOPIC INVESTIGATIONS ON NEUTRON INDUCED IMPURITY ATOMS AND RADIATION DEFECTS [EINFLUSS DER NEUTRONENBESTRAHLUNG AUF DIE OPTISCHEN EIGENSCHAFTEN VON TELLUR IN DER NAEHE DER BANDKANTE] **c72**
G. Fritsch, H. J. Coufal, U. Nagel, G. Maier, A. Schulte et al *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 590-1000 refs In GERMAN (For primary document see N85-12696 03-76)
Avail: NTIS HC A99/MF A01

The properties of neutron irradiated materials were spectroscopically investigated. The highly pure starting materials were homogeneously doped with impurity atoms by neutron irradiation via a nuclear process (neutron transmutation doping). This implantation procedure was studied with spectroscopic methods on defect structures and their recovery behavior. The study was performed on the model systems doping of tellurium single crystals with iodine - and of silicon single crystals with phosphorus. In the system Te : I the understanding of the properties of I-atoms and lattice damage in Te is broadened. Neutron transmutation doping of Si becomes more and more important in the semiconductors industry. The implantation of P-atoms on substitutional lattice places and the recovery of lattic defects were investigated with electron spin resonance measurements. The identification of known defect structures and the g-tensor of three unknown defect spectra are determined. Author (ESA)

N85-12743# Beersheva Univ. (Israel). Dept. of Nuclear Engineering.
MOSSBAUER EFFECT AND CONTACTLESS CONDUCTIVITY STUDIES OF SUPERCONDUCTING ACTINIDES INTER-

METALLICS AND HYDRIDES. MOSSBAUER HIGH PRESSURE STUDIES

J. Gal, S. Fredo, H. Pinto, M. Kuznietz, M. H. Mintz, Y. Jacob, H. Shaked, G. M. Kalvius (Technische Univ., Munich), W. Potzel (Technische Univ., Munich), M. Wunsch (Technische Univ., Munich) et al *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 601-636 refs (For primary document see N85-12696 03-76)

Avail: NTIS HC A99/MF A01

Actinides and hydrides were studied using the Mossbauer effect, neutron diffraction, susceptibility, X-rays, and a high pressure low temperature Mossbauer spectrometer which was developed. A contact-free conductivity susceptometer was built which allows one to determine critical temperature and critical fields by a very simple manipulation. A Guinier-type high pressure X-ray diffractometer is described. The compressibility of NpAl2 is found. Preparation and characterization of actinide intermetallics and hydrides are outlined. Hydrogen absorption in U(Alx Ni1-x)2 is analyzed. Magnetic properties of the cubic Laves phases NpAl2 and NpDS2 are determined with the high pressure Mossbauer spectrometer. The magnetic properties of the low symmetric Np CO2 Si2 are determined by neutron diffraction and Mossbauer spectrum at atmospheric pressure and the rigid spin model of Ruoterman-Kittel-Arrott is tested. The magnetic properties of NpCu4Al8 and NpCr4Al8 intermetallics are determined by Mossbauer effect, susceptibility and neutron diffraction. The composition dependence of nonstoichiometric Np-Laves compounds and its correlation to ordering temperature and atomic volume are determined by Mossbauer studies. Author (ESA)

N85-12744# Technische Univ., Munich (West Germany).

VOLUME COMPRESSIBILITIES OF TRANSURANIUM ELEMENTS COMPOUNDS, ESPECIALLY OF NEPTUNIUM COMPOUNDS [VOLUMENKOMPRESSIBILITAETEN VON VERBINDUNGEN TRANSURANISCHER ELEMENTE, INSBESONDERE DES NEPTUNIUMS] c72

G. M. Kalvius *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 637-647 refs In GERMAN (For primary document see N85-12696 03-76)

Avail: NTIS HC A99/MF A01

An angle-dispersive X-ray high pressure diffractometer was developed and used for the investigation of the change in electronic structure, especially of the magnetic properties, of the intermetallic neptunium compounds under volume compression. Apparatus and measuring method are described. The delocalization of 5f electrons in volume compressibility in the cubic Laves-phases NpOS2 and NpAl2 is determined. These measurements are completed by corresponding measurements on a highly localized actinide magnet (NpCO2Si2) with a behavior similar to rare Earth compounds. These measurements result in the pressure dependence of the magnetic and electron-structural properties of transuranium elements. Neutron diffraction measurements were performed. Author (ESA)

N85-12745# Technische Univ., Munich (West Germany).

REACTION MECHANISMS IN THE FORMATION OF INTERCALATION COMPLEXES, AND PROPERTIES OF INTERCALATED MOLECULES [REAKTIONSMECHANISMEN BEI DER BILDUNG VON INTERCALATIONKOMPLEXEN UND EIGENSCHAFTEN VON INTERCALIERTEN MOLEKUELEN] c72

H. Kammermeier, H. Meyer, H. Orth, and A. Weiss *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phy., 1980-1982 Mar. 1984 p 648-658 In GERMAN (For primary document see N85-12696 03-76)

Avail: NTIS HC A99/MF A01

Intercalation reactions were investigated using neutron diffraction. Intercalation reactions in kaolinite as host lattice occur in several steps. Guest components are adsorbed at the outer surface of the host cyrstals. Germs are formed with elastic deformation of the host lattice layers. The initial intercalation reaction follows a temporal law characteristic of phase boundary reactions. When the crystals around their total surface have reacted up to a depth of about 80A, the further reaction is determined by a two-dimensional diffusion. During intercalation of dimethylsulfoxide, the intercalation mechanism changes stepwise above 72 C. The intercalation behavior of kaolinite is essentially influenced by the domain structure of the host lattice. Twins (001)/(001) are not able to intercalate. Twins (001)/(001) start to react from both base surfaces. Normal crystals start to react at the (001) surface. The reaction mechanism changes below the critical crystal size. The consequence is that small crystals react slower than larger ones. The reaction velocity reaches a maximum with increasing crystal size. Author (ESA)

N85-12746# Mainz Univ. (West Germany). Inst. fuer Biochemie.

NEUTRON SMALL ANGLE SCATTERING OF THE FREE AND MEMBRANE-BOUND ATPASE [NEUTRONENKLEINWINKELSTREUUNG DER FREIEN UND MEMBRANGEBUNDENEN ATPASE] c72

K. Dose, U. Eul, I. Nawroth, R. Pabst, S. Risi, N. Wagner, and H. Conrad (Kernforschungsanlage, Juelich, West Germany) *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 659-674 refs In GERMAN (For primary document see N85-12696 03-76)

Avail: NTIS HC A99/MF A01

The biological system of the membrane protein complex F0F1ATPase was investigated using neutron small angle scattering. The studies were performed on cleaned bacterial ATPases. The scattering behavior of pure F1ATPase, pure F0F1ATPase-complex, and of a reconstituted model system consisting of cleaned F0F1ATPase and synthetic pure lipid-vesicles is determined. The last system is very important since it reproduced closely the natural membrane. A method is developed which allows one to study the spatial structure of lipid-bound membrane proteins without a disturbing effect of the lipid part of the proteoliposomes. This is obtained by selective masking of the lipid in the neutron scattering experiment. Author (ESA)

N85-12747# Mainz Univ. (West Germany). Inst. fuer Physikalische Chemie.

NEUTRON SCATTERING ON MACROMOLECULAR SOLID STATE MATERIALS, SOLUTIONS AND MELTS [NEUTRONENSTREUUG AN HOCHMOLEKULAREN FESTKOERPERN, LOESUNGEN UND SCHMELZEN]

E. W. Fischer, B. Ewen, B. Stuehn, D. Richter (Kernforschungsanlage, Juelich, West Germany), K. Binder (Kernforschungsanlage, Juelich, West Germany), and A. Baumgaerthner (Kernforschungsanlage, Juelich, West Germany) *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 675-686 refs In GERMAN (For primary document see N85-12696 03-76)

Avail: NTIS HC A99/MF A01

The chain mobility in high molecular weight polyethylene oxide PEO single crystals and the dynamics of polymer molecules in solutions and melts were studied using neutron scattering. Scattering experiments on PEO with a backscatter spectrometer show no considerable line broadening of motion components parallel or perpendicular to the fiber axis, even a few degrees below the melting point. This result means that the molecule mobility frequency of PEO chains in the crystalline domains is not higher than 10 to the seventh power, and that the direct determination of a motion component in the chain direction of polymer crystals is not possible with the presently available experimental means. Diffusion-like motion processes were investigated in liquid polymer systems by means of coherent quasielastic neutron scattering experiments on a spin-echo spectrometer and a backscatter spectrometer. The emphasis was on the motion behavior single chains in diluted solutions and melts, and on changes in the motion behavior as observed in diluted, semidiluted and concentrated solution in connection with dynamic transition phenomena (cross-over effects). Author (ESA)

N85-12748# Freiburg Univ. (West Germany).

DESCRIPTION AND CHARACTERIZATION OF DEUTERATED POLYMERS FOR THE ANALYSIS WITH NEUTRON SCATTERING [DARSTELLUNG UND CHARAKTERISIERUNG VON DEUT-

ERIERTEN POLYMEREN ZUR ANALYSE MIT NEUTRONENSTREUUNG] c27

C. D. Eisenbach, G. Wegner, M. Droescher, M. Peuscher, K. Lee, M. Weiss, and G. Schaechtele *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 687-695 refs In GERMAN (For primary document see N85-12696 03-76)

Avail: NTIS HC A99/MF A01

Preparative studies for the synthesis of deuterated and analogous undeuterated low molecular weight, and macromolecular substances were performed. The emphasis was on poly (ethylene terephthalate) (PET) and poly(ethylene oxide) (PEO). The synthesis of partially deuterated poly(ethylene) (PE), periodically deuterated n-alkanes, and deuterated segmented polyurethane (PU)-elastomers was started; the most important starting materials are synthesized preparatively and perdeuterated PU elastomers with static hard and soft segment length distribution are obtained. In connection with the clear characterization of the above substances, important findings are reported about the catalyst-and temperature dependent re-estering behavior of PET and about the unperturbed dimensions of PED in solution. These results are important for the performance and interpretation of neutron scattering experiments. Author (ESA)

N85-12749# Mainz Univ. (West Germany).

STRUCTURE AND KINETICS OF PHYSISORPTION, PROPERTIES OF HELIUM DURING REDUCTION OF THE DIMENSION [STRUKTUR UND KINETIK BEI PHYSISORPTION, EIGENSCHAFTEN VON HELIUM BEI REDUZIERUNG DER DIMENSION] c25

H. Wiechert, R. Feile, H. J. Lauter (ILL, Grenoble, France), J. Schaab, and C. Tiby *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1984-1982 Mar. 1984 p 696-706 refs In GERMAN (For primary document see N85-12696 03-76)

Avail: NTIS HC A99/MF A01

Boundary surface phenomena of the three-dimensional quantum systems He3 and He4, and properties of two-dimensional (2D) noble gas systems on homogeneous surfaces were investigated. It is shown that He4 strengthens itself in layers on the surface of graphite, while He3 does not show this behavior. Dispersionless surface excitations are observed in helium films and graphite blades totally filled with helium. Monolayers of adsorbed noble gas on graphite were chosen as model systems for the study of properties and phase transitions in 2D-matter. Phase diagrams and structures of these systems are determined, and closest neighbor distance, coherence length of the 2D-crystallite, and the intensity of Bragg reflection as a function of coverage and temperature are measured. The melting transitions are characterized and compared with the 2D-melting theories of Kosterlitz-Thouless and Halperin-Nelson. In the system of He3 adsorbed on graphite an anomalous decrease of the closest neighbor distance during melting is observed and explained with a defect model. The melting transition of Ne is of the first order, that of Ar is continuous. The phase transition commensurable-incommensurable of hydrogen and deuterium adsorbed on graphite is classified as first order. Author (ESA)

N85-12750# Ulm Univ. (West Germany).

SMALL ANGLE NEUTRON SCATTERING (SANS) ON POLYMER-OLIGOMER MIXTURES AND ON DEFORMED POLYETHYLENE MELTS [SANS AN POLYMER-OLIGOMER-MISCHUNGEN UND AN DEFORMIERTEN PE-SCHMELZEN] c27

E. Sautter and W. Pechhold *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 707-715 refs In GERMAN (For primary document see N85-12696 03-76)

Avail: NTIS HC A99/MF A01

Chain parallelism was quantitatively studied on marked oligomers in a short-chain and high molecular weight environment using small angle neutron scattering (SANS). Investigations were conduced on polyethylene-and polystyrol mixture systems. The SANS determined structure factor of the oligomers in the polymer matrix is compared with that in an ideal environment. An expression for the structure factor given by von de Gennes for the heterogeneous mixture system is experimentally confirmed in an enlarged concentration range. In the mixture systems polyethylene and polystyrol the effect of the matrix on the form of the oligomer-inclusively the molecular weight dependence of their inertia radii, predicted by the Maander model, is confirmed. For oligomers with about 20 to 100 (structure atoms the inertia radii in the polymer environment are up to 20% larger than in the ideal environment). The comparison between experimental scattering curves and numerical scattering calculations on oligomers randomly distributed in the Maandeer bundle, allows one to determine the size of the Maander blocks in the polymer matrix and in the oligomer melts, consistently with sizes determined with other measuring methods. Author (ESA)

N85-12751# Duisburg Univ. (West Germany).

NEUTRON SCATTERING ON POLYSILOXANES [NEUTRONENSTREUUNG AND POLYSILOXANES] c27

R. Kosfeld, B. Alefeld, H.-H. Grapengeter, M. Hess, U. Leclair, H. Schorn, and J. Weinberg *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 716-726 refs In GERMAN (For primary document see N85-12696 03-76)

Avail: NTIS HC A99/MF A01

The micro-Brownian movement processes were investigated in a high molecular weight polydimethylsolixane in the solid phase using neutron scattering. Thermally activated hindered rotations of the methyl groups and chain segments, libration modes, and tunnel rotation of the methyl groups were studied. The thermally activated hindered processes were thoroughly investigated with different experimental methods which give strongly deviating values of the activation energies. The study of the micro-Brownian movement using neutron scattering and nuclear magnetic resonance shows the same activation energy of the methyl group rotation for both measuring methods. The tunnel rotation of the methyl groups in a high molecular weight polymer system is determined. Author (ESA)

N85-12752# Technische Hochschule, Aachen (West Germany). Inst. fuer Anorganische Chemie.

NEUTRON SCATTERING FOR THE INVESTIGATION OF SOLID STATE MATERIALS, UTILIZATION IN CHEMICAL STRUCTURES [NEUTRONENSTREUUNG ZUR UNTERSUCHUNG FESTER STOFFE, ANWENDUNG IN DER STRUKTURCHEMIE]

W. Bronger *In* Kernforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 728-735 refs In GERMAN (For primary document see N85-12696 03-76)

Avail: NTIS HC A99/MF A01

Neutron scattering studies were performed on synthesized metal-chalcogenides and-hydrides. The magnetic structures of the compounds KFeS2, FbFeS2, RbFeSe2, Cs2 Mn3S4, and Cs2-Co3S4 are clarified. The measured magnetic moments are explained with a model which takes only electrostatic binding parts into account. An island structure with planar [PtD4] negatively ionized)-groups is found in the compound Na2PtD4 by neutron diffraction experiments. The structure of LiPt7 is clarified. Author (ESA)

N85-12753# Technische Univ., Munich (West Germany).

STATIC AND QUASIELASTIC NEUTRON SCATTERING FOR THE INVESTIGATION OF STRUCTURE, DYNAMICS AND TRANSPORT PROPERTIES OF LIPID LAYERS AND LIPID/PROTEIN COMPOUNDS [STATISCHE UND QUASIELASTISCHE NEUTRONENSTREUUNG ZUR UNTERSUCHUNG DER STRUKTUR, DYNAMIK UND TRANSPORTEIGENSCHAFTEN VON LIPIDSCHIGHTEN UND LIPID-/PROTEIN-LEGIERUNGEN]

E. Sackmann *In* Kernsforschungsanlage Rept. on Res. Results in Solid State Nucl. Phys., 1980-1982 Mar. 1984 p 736-756 refs In GERMAN (For primary document see N85-12696 03-76)

Avail: NTIS HC A99/MF A01

Lipid mixtures were investigated using small angle neutron scattering (SANS). It is shown that phase diagrams can be obtained.

The advantages compared to other methods are the measurement in thermodynamic equilibrium, the avoidance of molecular probes, and the possibility to observe demixing in purely fluid and purely solid states. Critical demixing phenomena in fluid state are observed in a special mixture. Preliminary tests on another mixture system show that domain sizes can be determined by SANS. Investigations on a special lipid-protein mixture show that the structure of proteins in their natural lipid environment can be determined. Author (ESA)

N85-12754# California Univ., San Diego, La Jolla. Dept. of Electrical Engineering and Computer Sciences.
RESEARCH ON MATERIALS AND COMPONENTS FOR OPTO-ELECTRONIC SIGNAL PROCESSING Annual Report, 1 Oct. 1982 - 30 Sep. 1983
W. S. C. Chang, J. M. Delavaux, S. Forouhar, T. VanEck, L. M. Walpita, C. Warren, and H. M. Wieder 24 Jan. 1984 33 p
(Grant AF-AFOSR-0037-80)
(AD-A145808; AFOSR-84-0823TR) Avail: NTIS HC A03/MF A01 CSCL 20/12

A number of papers representing the accumulated research results on the chirped grating lenses were prepared, submitted for publication, and summarized. A new direction of research to investigate the use of 3-4 compound semiconductors has shown that very large electro-optical effects may be expected in this wavelength range. Author (GRA)

N85-12755# Florida Univ., Gainesville. Dept. of Electrical Engineering.
STUDIES OF GROWN-IN DEFECTS VERSUS GROWTH PARAMETERS IN 3-4 COMPOUND SEMICONDUCTORS Annual Technical Report, 11 Jun. 1983 - 10 Jun. 1984
S. S. Li Jun. 1984 139 p
(Grant AF-AFOSR-0187-81)
(AD-A145864; AFOSR-84-0779TR) Avail: NTIS HC A07/MF A01 CSCL 20/2

The objectives of this research are to conduct: (1) A detailed analysis of the grown-in defects and radiation induced defects in GaAs and other 3-4 materials grown by the LEC, VPE, LPE, and MOCVD techniques under different growth and annealing conditions, (2) Theoretical modelling of the native defects for identifying the physical origins of the deep-level traps in GaAs and other III-V materials, (3) Theoretical and experimental study of the potential well of electron traps from analyzing the electric field enhanced emission rates deduced from the nonexponential DLTS data, and (4) Study of one-MeV electron irradiation induced deep-level defects in GaAs, AlGaAs, and InP materials. The main research accomplishments are summarized. GRA

N85-12756# Illinois Univ., Urbana. Dept. of Physics.
FOLDED ACOUSTIC AND QUANTIZED OPTIC PHONONS IN SEMICONDUCTOR SUPERLATTICES
C. Colvard, T. A. Gant, M. V. Klein, R. Merlin (Ataud and Bell Labs.), and R. Fischer Jul. 1984 66 p
(Contracts N00014-80-C-0701; N00014-79-C-0424; F49620-83-K-0201; Grants NSF-DMR82-03523; NSF-DMR80-20250)
(AD-A145935; ILL-(SS)-84-27) Avail: NTIS HC A04/MF A01 CSCL 12/1

Raman scattering studies of a variety of MBE-grown (GaAl)As superlattices are presented. Folded acoustic phonons appear as doublets in the Raman spectra. Their frequencies are accurately predicted by several models, including an approximate solution of an elastic continuum model through a perturbation approach. Scattering intensities of the folded acoustic modes are predicted by a photoelastic continuum model. Calculations on a layered dielectric continuum provide information about anisotropy of optical phonons. Linear chain model calculations indicate that optical phonons in binary superlattices are largely confined to alternate layers. Peaks in the Raman data are identified with the resulting quantized optic modes. It is shown that Raman scattering has the potential to provide structural information similar to that which can be obtained by X-ray diffraction. Author (GRA)

N85-12757# Cambridge Univ. (England).
NOVEL TRANSPORT AND RECOMBINATION PROCESSES IN SEMICONDUCTORS Annual Technical Report
M. Pepper Mar. 1984 70 p
(Contract DAJA37-82-C-0181)
(AD-A145969) Avail: NTIS HC A04/MF A01 CSCL 20/12

This report describes our work on spin dependent recombination to date and contains copies of preprints and reprints of our work on two dimensional transport. Our work on spin effects has succeeded in identifying both spin dependent generation and recombination. The obtained structure is described and it is shown that damage produced by avalanche injection of holes gives rise to an SDR signal. The major feature of our work on the electronic properties of two dimensional systems is the frequency production of fractional quantization in Si inversion layers and GaAs-AlGaAs heterojunctions. Decreasing the transport length scale reduces the role of disorder and enhances the electron-electron interaction. This work leads to the possibility of observation of a number of effects based on a trade off between localization and interactions. Other 2D topics discussed are the effects of the electron-electron interaction on transport in high magnetic fields and the role of disorder in altering the rate of electron-electron scattering. Author (GRA)

N85-12758# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
A STUDY OF DEFECTS IN NEUTRON TRANSMUTATION DOPED SILICON: GALLIUM BY HALL EFFECT ANALYSIS Interim Technical Report, Oct. 1982 - Oct. 1983
R. A. Gassman and W. C. Mitchel Jul. 1984 58 p
(AF Proj. 2306)
(AD-A146047; AFWAL-TR-83-4158) Avail: NTIS HC A04/MF A01 CSCL 20/12

Temperature-dependent Hall effect analysis has been used to study neutron transmutation doped, p-type silicon conventionally doped with gallium. Moderate temperature anneals of the irradiated material produced three shallow acceptor levels. The first, at 0.57 eV., was detected after prolonged anneals at 525 C and has been identified as the Ga-X level, a substitutional gallium-substitutional carbon complex. The other two levels appeared after anneals at 600 C. GRA

N85-12759# Aerospace Corp., El Segundo, Calif. Chemistry and Physics Lab.
STRUCTURAL STUDIES OF SPUTTERED MOS(2) FILMS BY ANGLE-RESOLVED PHOTOELECTRON SPECTROSCOPY
P. D. Fleischauer and L. U. Tolentino 6 Sep. 1984 27 p
(Contract F04701-83-C-0084)
(AD-A146052; TR-0084(4945-03)-3; SD-TR-84-27) Avail: NTIS HC A03/MF A01 CSCL 20/2

Molybdenum disulfide films were deposited by sputtering on both single-crystal molybdenite and steel substrates to assess the effects of varying preparation conditions on film properties. They were then examined by angle-resolved X-ray photoelectron spectroscopy, which provided information on the orientation of the layered crystal substrate, on the film layers immediately adjacent to the substrate (within 1-10 nm), and on thicker, macroscopic films composed of relatively large crystallites (approximately 70-200 nm). For the 4.3-nm-thick films deposited on the crystal's basal-plane surface, the angular dependence of the photoelectron emission is the same as the substrate's, indicating preferred orientation within such films. Angular distribution studies for thicker films on steel substrates are consistent with previous Auger electron spectroscopy results and confirm the presence of oxide films of different thickness of lubricant films with varying orientations. The angle-dependence data were fit to models that describe the structure and composition of the films' surfaces. GRA

N85-12760# Crystacomm, Inc., Mountain View, Calif.
INVESTIGATION OF LIQUID ENCAPSULATION CHOCHRALSKI GROWTH OF InP Final Report, Jul. 1981 - Jun. 1984
G. A. Antypas Aug. 1984 25 p
(Contract DAAG29-81-C-0013)

(AD-A146096; ARO-18026.3-EL-S) Avail: NTIS HC A02/MF A01 CSCL 20/2

Process have been been developed: (1) to synthesize polycrystalline InP by the injection of Phosphorus to boron oxide encapsulated Indium, and (2) to grow reproducible (100) oriented 7.5 cm diameter Indium Phosphide single crystals. These processes can be easily scaled up to yield crystals weighing to to 4 kilograms. GRA

N85-12761# Pennsylvania State Univ., University Park. Materials Research Lab.

CENTER FOR DIELECTRIC STUDIES

L. E. Cross, R. E. Newnham, and J. V. Biggers May 1984 145 p (Contract N00014-82-K-0339)

(AD-A146183) Avail: NTIS HC A07/MF A01 CSCL 20/12

This report focuses upon the parts of the Center program which have drawn most extensively upon Navy funds. In the basic study of polarization processes in high K dielectrics, major progress has been made in understanding the mechanisms in relaxor ferroelectric in the perovskite structure families. A new effort is also being mounted to obtain more precise evaluation of the internal stress effects in fine grained barium titanate. Related to reliability, studies of the effects of induced macro-defects are described, and preparation for the evaluation of space charge by internal potential distribution measurements discussed. To develop new processing methods for very thin dielectric layers, a new type of single barrier layer multilayer is discussed, and work on the thermal evaporation of oriented crystalline antimony sulphur iodide describe. GRA

N85-12762# Wisconsin Univ., Milwaukee. Dept. of Chemistry.

THE 6TH INTERNATIONAL SUMMER INSTITUTE IN SURFACE SCIENCE 1983) Final Report, 1 Mar. 1983 - 29 Feb. 1984

R. Vanselow 29 Feb. 1984 19 p Inst. held in Milwaukee, 1983 Sponsored in part by AF

(Contract N00014-83-G-0036)

(AD-A146253) Avail: NTIS HC A02/MF A01 CSCL 07/4

Partial Contents: Commensurate-Incommensurate Transitions on Surfaces; Fourier-Transform Infrared Spectroscopy in Heterogeneous Catalysis; Laser Studies of Surface Chemical Reactions; and Intrinsic and Extrinsic Surface Electronic States of Semiconductors. GRA

N85-12763# Aerospace Corp., El Segundo, Calif. Chemistry and Physics Lab.

THE EFFECT OF THIN-FILM GROWTH MODE ON XPS/UPS/AES INTENSITIES

P. A. Bertrand 27 Aug. 1984 33 p

(Contract F04701-83-C-0084)

(AD-A146284; TR-0084(4945-06)-4; SD-TR-84-32) Avail: NTIS HC A03/MF A01 CSCL 07/4

The growth mode of thin-film deposition must be taken into account when one assesses surface electron spectroscopy data for evidence of interdiffusion of deposited and substrate material. Three models of thin-film growth are examined for their influence on signal intensity: layer-by-layer growth and two different island-growth mechanisms. Island growth, in which islands of a fixed lateral dimension first grow to a given height and then spread to cover the surface, was found to fit available UPS (ultraviolet photoelectron spectroscopy) data on the deposition of Ag on Ge. More data, such as transmission electron micrographs verifying deposit growth mode or UPS valence band changes indicating Ag-Ge interactions, must be obtained before conclusions concerning diffusion vs. island formation can be made. Author (GRA)

N85-12764# Santa Barbara Research Center, Goleta, Calif.

HgCdTe SURFACE AND DEFECT STUDY PROGRAM Interim Technical Report, Jul. - Dec. 1983

J. A. Wilson, V. A. Cotton, J. A. Silberman, G. Carey, D. Laser, S. Cole, C. Shih, D. J. Friedman, I. Lindau, W. E. Spicer et al Jan. 1984 98 p Prepared in cooperation with Stanford Univ.

(Contract MDA903-83-C-0108)

(AD-A146343; SBRC-41514; ITR-2) Avail: NTIS HC A05/MF A01 CSCL 20/12

This interim report presents results obtained in the second six-month period of a three-year study of the interface region of HgCdTe. The effort is a collaboration of groups at Santa Barbara Research Center, Stanford University, SRI International, and Hughes Research Laboratories. The technical effort is divided into tasks to study: (1) interface properties which are important to device passivation; (2) surface effects and bulk defects due to ion implantation; (3) properties including defects of the free surface and defects of the alloy itself; and (4) theoretical analysis of bonding in random substitutional alloys as well as defect formation. GRA

N85-12765# Ames Lab., Iowa.

EFFECT OF A THERMAL GRADIENT APPLIED TO A SINUSOIDAL SURFACE PROFILE M.S. Thesis

Mark A. Eshelman Jun. 1984 113 p refs

(Contract W-7405-eng-82)

(DE84-015649; IS-T-1118) Avail: NTIS HC A06/MF A01

Investigation of an applied thermal gradient on a sinusoidal surface profile shows that the thermal gradient disrupts the normal amplitude decay seen under isothermal conditions. This change in the amplitude decay pattern characteristics is found to depend on the direction of the thermal gradients with respect to the sinusoidal surface profile. Breakup (of the profile along the crests of the waves) is found where the thermal gradient is parallel was required for breakup to occur. Following breakup coarsening of the spherical caps was also observed. When the thermal gradient is in the direction of the wave profile, a translation of the wave was observed (seen as asymmetry). An analytical model is proposed to predict the changes in the sinusoidal surface profiles which occur in the presence of a thermal gradient. Both translation of the wave profile and breakup of the profile are predicted when the thermal gradient is larger than some critical value. Numerical calculations are also given for the complete nonlinear case considering surface diffusion only. DOE

N85-12766# United Kingdom Atomic Energy Authority, Harwell (England). Materials Development Div.

TRANSPORT PROCESSES DURING THE GROWTH OF OXIDE FILMS AT ELEVATED TEMPERATURE

A. Atkinson Jun. 1984 95 p refs

(AERE-R-11293) Avail: NTIS HC A05/MF A01

The current understanding of the growth of thermal oxide films in terms of the transport properties of the oxides is reviewed. The two most useful theories of file growth are those of Wagner for thick films and Cabrera and Mott for thin films. Particular attention is given to examining the expected limits of validity of these theories and to the various ways in which their predictions can be tested experimentally. The growth of a selection of important oxides is then discussed in the light of these two theories. Except at very high temperatures, diffusion along oxide grain boundaries controls the rate of growth of the crystalline oxides. When this dominant contribution from grain boundary diffusion is taken into account, the Wagner theory describes the growth of most films thicker than approximately 10 nm reasonably well. The Cabrera and Mott theory is not so successful in describing the growth of thinner films. R.S.F.

N85-12767# United Kingdom Atomic Energy Authority, Harwell (England). Metallurgy Div.

A PHYSICAL INTERPRETATION OF THE STRUCTURE AND ELECTRON-OPTICAL DATA FOR SPINEL ($MgAl_2O_4$)

S. J. Shaibani Jun. 1984 50 p refs

(AERE-R-11278) Avail: NTIS HC A03/MF A01

The spinel structure is presented in an easily understandable form. This description is also expressed in an abbreviated form. Theoretical electron diffraction patterns are evaluated and are found to agree with the experimental TEM results obtained. Extinction distances for all low-order reflections in spinel were calculated for differing degrees of ionicity. Author

N85-12252# Joint Publications Research Service, Arlington, Va.
TWISTED DOMAIN WALL IN VERY THIN MAGNETIC FILMS WITH PERPENDICULAR ANISOTROPY Abstract Only
G. Ye. Khodenkov *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 21 Transl. into ENGLISH from Fiz. Metallov i Metalloved. (Sverdlovsk, USSR), v. 58, no. 1, Jul. 1984 p 37-41 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

N85-12253# Joint Publications Research Service, Arlington, Va.
EFFECT OF HEAT TREATMENT ON PHASE COMPOSITION AND CRYSTAL STRUCTURE OF THIN WSI2 FILMS ON SILICON SUBSTRATES Abstract Only
Ye. P. Biryukov, A. P. Dostanko, A. A. Maltsev, and G. M. Shakhlevich *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 22-23 Transl. into ENGLISH from Poverkhnost: Fiz., Khim., Mekhan. (Moscow), no. 6, Jun. 1984 p 97-102 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

N85-12254# Joint Publications Research Service, Arlington, Va.
ONE-DIMENSIONAL MODEL OF THIN FILMS. ANALYSIS OF ALUMINUM SURFACE Abstract Only
S. N. Bezryadin, V. D. Verner, and T. I. Yegorova *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 23 Transl. into ENGLISH from Poverknost: Fiz., Khim., Mekhan. (Moscow), no. 6, Jun. 1984 p 43-46 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

N85-12272# Joint Publications Research Service, Arlington, Va.
EFFECT OF OXIDIZING MEDIUM AND HEAT TREATMENT ON STOICHIOMETRY OF ZnSe CRYSTAL SURFACE Abstract Only
V. T. Sotnikov and S. S. Dobrotvorskiy *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 54 Transl. into ENGLISH from Poverkhnost: Fiz., Khim., Mekhan. (Moscow), no. 6, Jun. 1984 p 145-152 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

N85-12274# Joint Publications Research Service, Arlington, Va.
PRODUCING SEMICONDUCTOR MATERIALS BY SUPERFAST COOLING OF MELT Abstract Only
V. M. Glazov *In its* USSR Rept.: Mater. Sci. and Met. (JPRS-UMS-84-007) 24 Oct. 1984 p 60 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Neorgan. Materialy (Moscow), v. 20, no. 7, Jul. 1984 p 1238-1243 (For primary document see N85-12244 03-31)
Avail: NTIS HC A04/MF A01

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N85-12768 Illinois Inst. of Tech., Chicago.
SOLUTION GENERATING TECHNIQUE FOR THE EINSTEIN EQUATIONS Ph.D. Thesis
Dong-sheng Guo 1984 106 p
Avail: Univ. Microfilms Order No. DA8418390

To look for physically significant exact solutions of the Einstein equations, especially for stationary, axially symmetric solutions, i.e., rotating body solutions, has been a famous problem for several decades. After 1977, solution-generating techniques were developed very rapidly, e.g., the Kinnersley-Chitre (K-C) transformations, Harrison's Backlund transformation, Neugebauer's Backlund transformations, and the latest generating technique, the homogeneous Hilbert problem (HHP) formulated by Hauser and Ernst. On the basis of the HHP, the author shows in this dissertation how to use various transformations to generate famous known solutions as well as new solutions. The main part of this dissertation concerns the treatment of a large class of K-C transformations (polynomial transformations), both in the vacuum and the electrovac case, encompassing many well-known transformations. By using the polynomial transformations, the author generates without iteration a many-parameter solution for the vacuum which is a natural generalization of the N-fold Neugebauer solution, and a many-parameter solution for the electrovac which is a natural generalization of the N-fold Cosgrove solution. Dissert. Abstr.

N85-12769# State Univ. of New York, Binghamton. Dept. of Chemistry.
THERMODYNAMICS AND PHASE EQUILIBRIA IN THE VANDIUM-SILICON SYSTEM Interim Report, 1 Jul. 1982 - 30 Jun. 1985
E. K. Storms and C. E. Myers 1 Sep. 1984 21 p
(Contract N00014-82-K-0501)
(AD-A145870; TR-2) Avail: NTIS HC A02/MF A01 CSCL 07/4

The vandium-silicon system has been investigated by Knudsen cell-mass spectrometry in the temperature range 1600-2000K. Thermodynamic activities were obtained by direct comparison with the elements. Vanadium disilicide was shown to have a negligible range of homogeneity and V6Si5 to be stable only at high temperatures. GRA

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

N85-12770# Committee on Science and Technology (U. S. House).
EMERGENCY MATHEMATICS AND SCIENCE EDUCATION ACT
Washington GPO 1984 331 p Hearings on H.R. 1310 before the Comm. on Sci. and Technol., 98th Congr., 1st Sess., no. 99, 9, 16, Feb. 1983
(GPO-29-561) Avail: Committee on Science and Technology

Positive and negative aspects are identified in a bill that would: (1) provide assistance to elementary and secondary levels of education to improve the quality of instruction and achievement; (2) support postsecondary education; establish a national policy on science and engineering manpower as well as an engineering and science personnel fund for matching grants. Congressional scholarships, budget allocations, and degree of targeting are among the issues discussed. A.R.H.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N85-12771# Comptroller General of the United States, Washington, D.C.
WAYS TO IMPROVE MANAGEMENT OF FEDERAL FUNDED COMPUTERIZED MODELS
[1983] 51 p
(LCD-75-111) Avail: NTIS HC A04/MF A01

Successfully developed models can be of assistance in the management of Federal programs, however, GAO found that many model development efforts experienced large cost overruns, prolonged delays in completion, and total user dissatisfaction with the information obtained from the model. GAO identified many of the problems that caused ineffective and inefficient use of the models. A phased approach was used which identified major activities necessary for planning, managing, and controlling model development efforts. It is recommended that the Department of Commerce formulate standards for, and GAO develop and provide

guidance, to Federal agencies for improving management of computerized models. A.R.H.

N85-12772# Air Command and Staff Coll., Maxwell AFB, Ala.
MATRIX ORGANIZATIONS: OVERCOMING THE DISADVANTAGES
H. E. Berg Apr. 1984 44 p
(AD-A145318; ACSC-84-0225) Avail: NTIS HC A03/MF A01 CSCL 05/1

This paper is a background on the matrix management organizational structure. The author identifies typical disadvantages of the matrix organization with the focus on project and functional managers, functional experts, and project teams. Various techniques to counteract these disadvantages are examined and evaluated for potential application in matrix organizations. GRA

N85-12773# California Univ., Berkeley.
[RESEARCH IN DATA MANAGEMENT AND SYSTEM RELIABILITY]
R. E. Barlow 20 Jul. 1984 11 p
(Grant AF-AFOSR-0122-81)
(AD-A145498; AFOSR-84-0728TR) Avail: NTIS HC A02/MF A01 CSCL 05/1

The report summarizes research during this period supported by the grant. Topics covered include system reliability, determining sample size for life test experiments, data extractions procedures, and acceptance sampline procedures. Abstracts of papers written during this period are included. Author (GRA)

N85-12774# RAND Corp., Santa Monica, Calif.
INTRODUCTION TO THE SUBJECTIVE TRANSFER FUNCTION APPROACH TO ANALYZING SYSTEMS Interim Report
C. T. Veit, M. Callero, and B. J. Rose Jul. 1984 62 p
(Contract F49620-82-C-0018)
(AD-A145817; RAND/R-3021-AF) Avail: NTIS HC A04/MF A01 CSCL 05/1

The subjective transfer function (STF) approach is a general subjective measurement method developed to evaluate complex systems where groups of people differing in expertise directly and indirectly affect system outcomes. The approach is based on the principles of hypothesis formulation and testing. It incorporates features of the algebraic modeling approach to measurement where meaningful subjective scale values derive from tested theories; it provides additional features necessary for coalescing judgments obtained from different groups of system experts into an overall perceptual outcome. This report introduces and is a primer of the STF method. It outlines the steps involved in the approach, describes how those steps can be accomplished, and discusses measurement principles and techniques to aid the reader's understanding of the basis for the approach. Author (GRA)

N85-12775# Department of Defense, Washington, D. C. Directorate for Information Operations and Reports.
COMPANIES PARTICIPATING IN THE DEPARTMENT OF DEFENSE SUBCONTRACTING PROGRAM, FIRST THREE QUARTERS FISCAL YEAR 1984
1984 85 p
(AD-A146137; P14) Avail: NTIS HC A05/MF A01 CSCL 15/5

This report presents a variety of subcontract data collected from Department of Defense (DOD) large business firms that have received at least one award in excess of $500,000 ($1,000,000 for construction). Table II-1 shows the dollar amounts and percent distribution of awards from DOD contractors to large, small, and small disadvantaged businesses for first three quarters FY 1983 and first three quarters FY 1984. Table II-2 summarizes DOD subcontracting program commitments for first three quarters FY 1984. Tables II-3 and II-4 summarizes small and small disadvantages business subcontracting goals and achievements. Detailed information from the Army, Navy, Air Force, and Defense Logistics Agency (DLA) is presented in Part 3, Sections 1 through 4. GRA

N85-12776# Naval Postgraduate School, Monterey, Calif.
A METHODOLOGY FOR COMPARING THE VARIABLE COSTS OF THE CONTINUOUS AND PERIODIC REVIEW MODELS M.S. Thesis
C. D. Knaggs Mar. 1984 69 p
(AD-A146351) Avail: NTIS HC A04/MF A01 CSCL 14/1

The optimal use of the continuous review model requires that an inventory system be examined after the receipt of every demand. Sometimes a delay can be encountered in the timing of these reviews due to several uncontrollable factors. As the length of these delays increases, a point is reached where it is better to switch the inventory system to a periodic review model. This thesis develops a methodology by which this point can be found for varying cost factors and demand levels. Using simulation, an example series of curves is presented that demonstrates the optimal point to switch inventory models for selected lead times. If delays are expected in the time between reviews, using the methodology offered in this paper will provide the manager an informational criterion for deciding what inventory model to use in a stocking system. GRA

N85-12777# Office of Management and Budget, Washington, D.C.
FIVE-YEAR PLAN FOR MEETING THE AUTOMATIC DATA PROCESSING AND TELECOMMUNICATIONS NEEDS OF THE FEDERAL GOVERNMENT. VOLUME 1: PLANNING STRATEGIES Final Report
May 1984 83 p Prepared in cooperation with GSA, Washington, D.C., and Commerce Dept., Washington, D.C. 2 Vol.
(PB84-214501) Avail: NTIS HC A05/MF A01 CSCL 05A

The first volume, A Five-Year Plan for Meeting the Automatic Data Processing and Telecommunications Needs of the Federal Government: Planning Strategies, describes the planning process and examines the planning effort of several typical agencies. It also provides a survey of the current state of planning among the cabinet agencies and explores some of the issues involved in managing the evolution of the new technology. GRA

N85-12778# Office of Management and Budget, Washington, D.C.
FIVE-YEAR PLAN FOR MEETING THE AUTOMATIC DATA PROCESSING AND TELECOMMUNICATIONS NEEDS OF THE FEDERAL GOVERNMENT. VOLUME 2: MAJOR INFORMATION TECHNOLOGY SYSTEMS ACQUISITION PLANS OF FEDERAL EXECUTIVE AGENCIES, 1984-1989 Final Report
May 1984 380 p Prepared in cooperation with GSA, Washington, D.C. and Commerce Dept., Washington, D.C. 2 Vol.
(PB84-214519) Avail: NTIS HC A17/MF A01 CSCL 05A

This is the second of two volumes. Volume 2 contains the information technology acquisition plans of the Federal Government, broken out by agency and component. Volume 2 is arranged into three major sections. Section 1 contains an analysis of major information technology acquisitions by Federal executive agencies. Section 2 is the compilation of planned executive agency information technology procurement obtained from the 1985 Federal budget. Section 3 is an agency index. GRA

N85-11990# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
AIR FORCE MATERIALS LABORATORY PLANS/PROJECTS
S. Lee *In* Defense Systems Management Coll. DoD Robotics Appl. Workshop Proc. 1983 p 372-378 (For primary document see N85-11978 03-01)
(AD-P004010) Avail: NTIS HC A21/MF A01 CSCL 05/1

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N85-12779 Case Western Reserve Univ., Cleveland, Ohio.
INTERDISCIPLINARY STRUCTURE OF INFORMATION SCIENCE

Ph.D. Thesis
Shahrokh Afsharpanah 1984 210 p
Avail: Univ. Microfilms Order No. DA8414058

The interdisciplinary structure of information science is explored on the basis of its subject literature. A basic assumption is that subject literature reflects the contents of a field, and that its citation patterns can serve as a source of data for identifying the interdisciplinary encounter that occurs between that field and other disciplines. Therefore, information science is operationally defined as a body of recorded and published knowledge that is designed and classified as information science in the secondary bibliographic sources, such as abstracts and indexes. The data for the study consists of the citations found in a random sample of the articles reviewed in 13 years of the Annual Review of Information Science and Technology. Information science literature was evaluated as a source of data to identify the subjects that build up the core interdisciplinary structure of the field, as well as the interdisciplinary demands of individual information science subfields. A socio-scientific approach of the study is to evaluate the impact that authors contributing to the interdisciplinary developments of information science have on other authors in the field on the basis of the citations they receive in the professional literature. Dissert. Abstr.

N85-12780 Indiana Univ., Bloomington.
INFORMATION PROCESSING FOR BETTER UTILIZATION: ASSESSING THE CLER MODEL AS ORGANIZER FOR INNOVATION DIFFUSION AND PLANNED CHANGE INFORMATION REPORTED IN SELECTED STUDIES IN THE ERIC SYSTEM Ph.D. Thesis
Gary Wayne Brown 1984 440 p
Avail: Univ. Microfilms Order No. DA8417175

The impact on knowledge utilization of a research review organized according to the CLER model of planned change was assessed. An examination of the services performed by eleven available education databases revealed at least two significant obstacles to knowledge use that are subject to amelioration: (1) appropriate information is often difficult to locate, and (2) even when retrieved, information is often difficult to interpret. The premises undergirding the study were that knowledge utilization would increase if (1) knowledge was processed rather than merely abstracted, (2) the processed knowledge was organized according to a general theory appropriate to an area of specialization, and (3) individual information items were classified according to the general theory. A research review was conducted using 50 innovation diffusion and planned change documents available through the Educational Resources Information Center (ERIC) system. The categories for the review, as well as the descriptive terminology, were derived from the concepts and constructs of the CLER model. The usefulness of such a theoretically-based organization of information was assessed by a panel.
Dissert. Abstr.

N85-12781 Oklahoma Univ., Norman.
A TOPOLOGICAL APPROACH TO DATABASE THEORY Ph.D. Thesis
Ki Hoon Baik 1984 110 p
Avail: Univ. Microfilms Order No. DA8418572

The data modeling techniques which are currently used to construct the logical view of data have made use of trees, graphs, and sets, as underlying data structures. However, these structures have certain limitations when used in dynamic database representation for database design procedures. The topological approach to the data modeling makes use of abstract spaces and topologies as mathematical structures. The database space, which serves as a logical view of the data, is introduced with the concept of topological space. Then, the topological structure provides the concept of equivalence testing between database spaces. Furthermore, the concept of database space equivalence provides the foundation of the database generator which is an automatic database design machine. In the database space, the microcosmic set represents the set of attributes and it plays a major role for the intra-record type representation, while the selected topology represents the set of pseudo-entity types and its product topology plays a major role for the inter-record type representation in the database design level. Dissert. Abstr.

N85-12782 Wisconsin Univ., Madison.
A BUILDING BLOCKS APPROACH TO STATISTICAL DATABASES Ph.D. Thesis
Setrag Nishan Khoshafian 1984 154 p
Avail: Univ. Microfilms Order No. DA8414245

In recent years, considerable attention was given to various data management issues for statistical databases. However, most of the research in statistical databases has concentrated on retrieval, sampling, and aggregation type statistical queries. Data management issues associated with the complex and computational statistical queries have been ignored. An integrated approach to statistical databases is endorsed. In an integrated system, the database management software supports both data retrieval and computational queries. As a first step towards an integrated system the performance of three important statistical computational methods: X'X, the QR decomposition, and the Singular Value Factorization are identified and analyzed. Two alternative secondary storage organizations: the transposed and relational organizations are compared. Several implementation strategies for each computational method are proposed.
Dissert. Abstr.

N85-12783 Illinois Inst. of Tech., Chicago.
A METHODOLOGY FOR SUPPORTING VIEWS IN RELATIONAL DATABASES Ph.D. Thesis
Ashok Pahwa 1984 171 p
Avail: Univ. Microfilms Order No. DA8418396

A pragmatic strategy for supporting views in relational management systems is provided. A cohesive theory for views was developed by reformulating a number of ideas about view formation, data retrieval, and update through views available in the current literature. In views defined over cyclic databases it is possible to have more than one join path between two sets of attributes. The underlying assumption about the database dictates the strategy for query processing in this environment. Query processing for views defined over a cyclic Maximal Object under the Conflict Free Property are studied. The concept of the Maximal Object is related with the updatability of views under the Conflict Free Property. A more general criterion for the formation of updatable views is obtained by looking at the updatable components of all source relations. These updatable views allow a wider class of updates. Dissert. Abstr.

N85-12784 Pennsylvania Univ., Philadelphia.
PRESERVING THE TIME DIMENSION IN INFORMATION SYSTEMS Ph.D. Thesis
Gad Ariav 1984 219 p
Avail: Univ. Microfilms Order No. DA8417256

Time is a universal and pervasive aspect of human activities, yet it is rarely reflected in the ways computer-based information systems are constructed. A useful and feasible design of a data management system that captures and preserves the inherent dynamics of its content, and explicitly deals with time as it stores, retrieves, and presents data is identified. The functional requirements for temporally oriented information systems, the formulation of a data model that captures subtle aspects of the time dimension, the formulation of end-user's syntax for querying a database based on such data model, and the design of an integrated user interface that graphically conveys temporal properties of data retrieved from the associated database are presented. The guidelines along which the temporally oriented data model and a corresponding data management system were developed are explicated.
Dissert. Abstr.

N85-12785* National Aeronautics and Space Administration, Washington, D. C.

NASA THESAURUS SUPPLEMENT: A 3-PART CUMULATIVE SUPPLEMENT TO THE 1982 EDITION OF THE NASA THESAURUS

Jul. 1984 29 p

(NASA-SP-7051(Suppl-2); NAS 1.21:7051(Suppl-2)) Avail: NTIS HC $6.50 CSCL 05B

The three part cumulative NASA Thesaurus Supplement to the 1982 edition of the NASA Thesaurus includes: part 1, hierarchical listing; part 2, access vocabulary, and part 3, deletions. The semiannual supplement gives complete hierarchies for new terms and includes new term indications for terms new to this supplement. E.A.K.

N85-12786# Fondo Colombiano de Investigaciones Cientificas y Proyectos Especiales, Bogota (Colombia).

PRIMER ON THE REGISTRATION OF TECHNICAL INFORMATION IN INDUSTRY [CARTILLA PARA EL REGISTRO DE LA INFORMACION TECNICA EN LA INDUSTRIA]

Guillermo Camacho Caro and Carlos Munoz Gutierrez 1983 131 p In SPANISH

Avail: NTIS HC A07/MF A01

Some methods of recording information about processes, raw materials, plans, models, and other factors germaine to industrial production in formats that are suitable for classification in accordance with the needs of the enterprise are presented. Pilot trials for information recording were carried out in the enterprises of Induacoples, Racores de Colombia, Metalfisher by Cerverceria Andina. Deficient recordkeeping can result in: lack of valid data for improving production processes and products; impossibility of controlling manufacturing costs; deficient infrastructure for acquiring technology available on the international market; impossibility of capitalizing on technological resources; and difficulty of adopting quality control systems. Other points analyzed are: prototypes, value analysis, and codification with sample forms for keeping records on machinery, tools, processes, etc. B.G.

N85-12787*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

NSSDC AND WDC-A-R AND S DOCUMENT AVAILABILITY AND DISTRIBUTION SERVICES

Oct. 1983 15 p

(NASA-TM-87374; NSSDC/WDC-A-R/S-83-15; NAS 1.15:87374) Avail: NTIS HC A02/MF A01 CSCL 05B

Documents available from the national space science data center (NSSDC) and the world data center A for rockets and satellites (WDC-A-R&S), are described. The availability, costs, ordering procedures for documents presently available, and the procedures for obtaining future documents are given. E.A.K.

N85-12788# Stanford Univ., Calif. Dept. of Computer Science.

ON COMPLEMENTARY AND INDEPENDENT MAPPINGS ON DATABASES

A. M. Keller and J. D. Ullman 1984 7 p

(Grants N00039-82-G-0250; AF-AFOSR-0212-80)

(AD-A145557; AFOSR-84-0708TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

This document defines the notion of independent views to indicate whether the range values of the two views may be achieved independently. The concepts of complementary views indicates when the domain element can be uniquely determined by the range values of the two complementary views. The relationship between independent and complementary views is considered. In unrestricted domains, a view (but not the identify or empty view) can have more than one complementary, independent view. Databases, however, are more restricted domains: They are finite power sets. A view is monotonic if it preserves inclusion. However, in finite power sets when all views are monotonic, if a given view has another view which is independent and complementary, then this view is unique. GRA

N85-12789# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.

ANALYSIS OF DATA ENTRY PERFORMANCE: CHROMATIC VERSUS MONOCHROMATIC Ph.D. Thesis

R. L. Rose May 1984 236 p

(AD-A145568; AFIT/CI/NR-84-48D) Avail: NTIS HC A11/MF A01 CSCL 05/10

The effects of color versus monochrome video display terminals on the quality and speed performance of experienced data entry personnel were investigated. The study considered operators experienced with the tested data entry task performed in a typical workforce environment. The task involved computer entry of data for applicants requesting admission to Arizona State Univ. Nine operators with a minimum of 1.5 years experience on this job participated. All operators were female, ranging in age from 21 to 56 years. Dependent variables included objective measures of operator performance, speed and error rate, and a set of subjective measures of operator attitude. Four independent variables were considered: type of terminals (color and monochrome display), age of operator (35 years or less and greater than 35 years), experiences level of operator (2 years or less and more than 2 years), and time of day of data entry (prior to noon and at or after noon). Results were that the attribute of color in the visual display used to accomplish data entry does not effect speed or error rate of the experienced operator. Subjectively, the attitude of the experienced operator was more supportive of monochrome display than color display. GRA

N85-12790# Lesley Coll., Cambridge, Mass.

MAINTENANCE MANAGEMENT INFORMATION AND CONTROL SYSTEM (MMICS): ADMINISTRATIVE BOON OR BURDEN

T. P. Murray Mar. 1984 59 p

(AD-A145762) Avail: NTIS HC A04/MF A01 CSCL 05/2

Thirteen years of Air Force design and development went into the Maintenance Management Information and Control System (MMICS), an automated maintenance information system, because maintenance managers need fast, up-to-date maintenance-related data. MMICS is an on-line computer system accessed through remote terminals located in the work area. These terminals communicate with a central base-level computer via telephone circuits. MMICS has wide application and provides automated information to managers of aircraft, missile and communications-electronic organizations. MMICS is currently in operation at one hundred forty Air Force units located at more than one hundred bases. Approximately eight hundred remote terminals and five hundred line printers are installed and in use worldwide. In aircraft maintenance organizations, MMICS provides information on changing aircraft and equipment conditions, parts requirements, aircraft schedules, equipment status and personnel resources and training. Personnel training is an important aspect of a manager's job and is vital to any organization that must maintain a proficient and experienced work force. The purpose of the project is to examine, determine and evaluate the benefit of the MMICS to managers and supervisors in conducting and monitoring training and training programs within their sections. GRA

N85-12791# International City Management Association, Washington, D.C.

DESIGN OF A SCIENTIFIC INFORMATION COLLATION AND DISSEMINATION SYSTEM, VOLUMES 1 THRU 3 Final Technical Report

G. J. Hoetmer, A. C. Paul, and N. Carson 28 Jun. 1984 203 p

(Contract EMW-C-0877)

(AD-A146002) Avail: NTIS HC A10/MF A01 CSCL 05/2

The purpose of this study is to: (1) determine the scientific and technological information needs of the emergency management community, and (2) explore the options available to the Federal Emergency Management Agency to coordinate or develop a mechanism to provide this information. GRA

N85-12792# Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.

PSYCHOLOGICAL ISSUES IN THE DESIGN OF EXPERT SYSTEMS

B. W. Hamill Jul. 1984 23 p

(Contract N00024-83-C-5301)

(AD-A146081; TR-ZEY-84-01) Avail: NTIS HC A02/MF A01 CSCL 05/2

Recent advances in the artificial intelligence technology of knowledge-based expert systems have captivated the imaginations of designers, sponsors, and suppliers of computer-based systems in government and industry as well as researchers in university and non-profit laboratories where the technology originated. An expert system is essentially a way to capture the knowledge and expertise of a subject-matter expert and transfer it to a computer program in hopes of creating an intelligent computer system that will emulate the problem-solving and decision-making performance of the expert. Such systems are being built to serve as intelligent advisors and decision aids in a wide variety of application areas. We discuss conceptual issues underlying expert system design, with references to current psychological and artificial intelligence literature, and urge consideration of these issues before undertaking development of expert systems. Author-assigned Keywords include: Knowledge-based systems; Knowledge acquisition; Knowledge representation; Mental models; and Decision aids. GRA

N85-12793# Naval Postgraduate School, Monterey, Calif.
AN APPROACH TO INTERFACING DATA BASES IN WWMCCS ADP M.S. Thesis
S. K. McCoy Mar. 1984 67 p
(AD-A146350) Avail: NTIS HC A04/MF A01 CSCL 09/2

Evolving requirements including the development of the Joint Operation Planning and Execution System (JOPES) are forcing the Worldwide Military Command and Control System (WWMCCS) ADP community toward the development of a distributed data base approach to information management. In this thesis the Electronic Data Interchange (EDI) concept is examined as a proposed system for realizing a distributed data approach. Using the EDI concept, any command which could translate to and from the EDI standard data set could exchange data with any other participating command. Implementation of this sort of system would facilitate interfaces among commands while not limiting participating commands to specific hardware, software, or data base management systems. The thesis proposes the EDI concept as a step toward realization of better data distribution and management in WWMCCS ADP. Author (GRA)

N85-12794# World Wildlife Fund, Inc., Washington, D.C.
CORPORATE USE OF INFORMATION REGARDING NATURAL RESOURCES AND ENVIRONMENTAL QUALITY
R. E. Train 16 May 1984 100 p refs Sponsored in part by Council on Environmental Quality
(PB84-222736) Avail: NTIS HC A05/MF A01 CSCL 13B

Findings and recommendations from a one-year study of the corporate use of information regarding natural resources and environmental quality are presented. Personal interviews were conducted with 229 information users at 45 of America's largest corporations, trade associations and private information companies. In addition, 110 information users participated in a written survey. GRA

N85-12795# Coast Guard District (13th), Seattle, Wash.
INFORMATION CENTER HANDBOOK Final Report
J. R. Lindeblad Aug. 1983 21 p
(PB84-211341; DOT/1-83-44) Avail: NTIS HC A02/MF A01 CSCL 05B

The support given by the U.S. Coast Guard's District Office in Seattle, Washington to its officers and staff who are using microcomputers is described. The Information Center offers training, consultation, and assistance to Coast Guard users of the microcomputers and software packages available to the organization. The document describes the organization of the Center, the services it provides, and the software packages it supports. An appendix includes several pictures of the operational facility to illustrate the logistics involved. The report should be especially useful to anyone planning support functions for microcomputer users. GRA

N85-12796# Interior Dept., Washington, D.C.
IRM (INFORMATION RESOURCES MANAGEMENT) LONG-RANGE PLAN: FISCAL YEAR 1984-1988 (UPDATE). VOLUME 2: ADP AND TELECOMMUNICATIONS ACQUISITION PLAN
May 1984 51 p
(PB84-229244) Avail: NTIS HC A04/MF A01 CSCL 05B

The IRM LRP provide guidance for improving management of the Interior Department's information resources. Data processing and telecommunications equipment acquisitions are discussed. The types of technology, services, and facility management are detailed. The budget formulation process is reviewed. E.R.

N85-12797# Drexel Univ., Philadelphia, Pa. Coll. of Information Studies.
EVALUATION OF THE NATIONAL LIBRARY OF MEDICINE'S PROGRAMS IN THE MEDICAL BEHAVIOR SCIENCES. COVERAGE OF THE MEDICAL BEHAVIORAL SCIENCES (MBS) LITERATURE IN MONOGRAPHIC DATABASES, STUDY 5
J. D. Saye, N. E. Selinger, D. T. Steere, Jr., K. Subramanyam, and B. C. Griffith Jan. 1984 268 p refs 6 Vol.
(Contract NO1-LM-23510)
(PB84-230531; NLM-82/302/5) Avail: NTIS HC A12/MF A01; also available in set of 6 reports HC E99 as PB84-230473 CSCL 05K

The objective was the development and test of a methodology by which the National Library of Medicine could evaluate the level of coverage of monographs using CATLINE. The medical behavioral sciences (MBS) literature was the test site for this research. The present study reports on the development of a citation-derived sampling technique to sample MBS monographs and the gathering and analysis of data through that technique. Other online monograph databases furnish critically important comparative data against which to test the utility of any particular monograph collection and any pattern of coverage. GRA

N85-12798# Drexel Univ., Philadelphia, Pa. Coll. of Information Studies.
EVALUATION OF THE NATIONAL LIBRARY OF MEDICINE'S PROGRAMS IN THE MEDICAL BEHAVIOR SCIENCES. ONLINE SEARCHERS' REACTIONS TO DATABASE AND VENDOR CAPABILITIES IN THE MEDICAL BEHAVIORAL SCIENCES (MBS), STUDY 4 Final Report
M. C. Drott, K. W. McClain, B. A. Rapp, V. A. Musico, and B. C. Griffith Apr. 1984 20 p refs 6 Vol.
(Contract NO1-LM-23510)
(PB84-230523; NLM-82/302/4) Avail: NTIS HC A02/MF A01; also available in set of 6 reports HC E99 as PB84-230473 CSCL 05K

This study attempts to gather data which will assist in the design of search capabilities, command structures and new user services for host systems and databases. The source of this data was the record of two focused discussion groups. The comments made by these groups are organized and briefly summarized. GRA

N85-12799# Drexel Univ., Philadelphia, Pa. Coll. of Information Studies.
EVALUATION OF THE NATIONAL LIBRARY OF MEDICINE'S PROGRAMS IN THE MEDICAL BEHAVIOR SCIENCES. QUALITY OF INDEXING: THE DEVELOPMENT AND TESTING OF A METHODOLOGY COMPARING DATABASES COVERING THE MEDICAL BEHAVIORAL SCIENCES (MBS) LITERATURE, STUDY 3
H. D. White, B. C. Griffith, J. A. Cowan, N. E. Selinger, and D. T. Steere, Jr. Jan. 1984 105 p 6 Vol.
(Contract NO1-LM-23510)
(PB84-230515; NLM-82/302/3) Avail: NTIS HC A06/MF A01; also available in set of 6 reports HC E99 as PB84-230473 CSCL 05K

The present study presents a way of evaluating descriptor-based indexing. A full appreciation of this method of evaluation as a methodology requires some consideration of the nature and function of such indexing. Fundamentally, indexing involves the application of a set of descriptor terms to a document. The descriptor terms are selected so as to represent the content of

the document and are identified with the document, sometimes through code numbers which have the additional functions of classifying and arranging the document collection. Descriptors with document assignments are alphabetized to create an index (inverted file) to allow subsequent subject searching of the document collection. GRA

N85-12800# Drexel Univ., Philadelphia, Pa.
EVALUATION OF THE NATIONAL LIBRARY OF MEDICINE'S PROGRAMS IN THE MEDICAL BEHAVIOR SCIENCES. TEST RETRIEVALS IN FIVE MAJOR DATABASES COVERING THE MEDICAL BEHAVIORAL SCIENCES (MBS) LITERATURE, STUDY 2 Final Report
K. W. McClain, H. D. White, B. C. Griffith, S. B. Horwitz, and N. E. Selinger Jan. 1984 115 p refs 6 Vol.
(Contract NO1-LM-23510)
(PB84-230507; NLM-82/302/2) Avail: NTIS HC A06/MF A01; also available in set of 6 reports HC E99 as PB84-230473 CSCL 05K

The present study tests MEDLINE's ability to deliver useful citations in response to queries in the medical behavior sciences (MBS). Like other project studies, it examines MEDLINE performance in the context of the performance of other major databases. Although the study analyzes several facets of MEDLINE performance, it also calls on the results of other project studies. GRA

N85-12801# Drexel Univ., Philadelphia, Pa. Coll. of Information Studies.
EVALUATION OF THE NATIONAL LIBRARY OF MEDICINE'S PROGRAMS IN THE MEDICAL BEHAVIOR SCIENCES. COVERAGE, OVERLAPS AND GAPS IN BIBLIOGRAPHIC DATABASES DEALING WITH THE MEDICAL BEHAVIORAL SCIENCES (MBS) LITERATURE, STUDY 1 Final Report
D. T. Steere, Jr., B. C. Griffith, J. A. Cowan, M. C. Drott, and N. E. Selinger Nov. 1983 314 p refs 6 Vol.
(Contract NO1-LM-23510)
(PB84-230499; NLM-82/302/1) Avail: NTIS HC A14/MF A01; also available in set of 6 reports HC E99 as PB84-230473 CSCL 05K

The present study was one of two studies designed to gather data on MEDLARS performance in selecting the medical behavioral sciences (MBS) literature for indexing and, indirectly, for general accessibility to the medical and auxiliary professions. The overall rationale of both studies was to test coverage of large samples of relevant literature which, while broadly representative of the major MBS fields, oversampled smaller disciplines. The present study generated the sample and considers the coverage of documents identified as serials. GRA

N85-12802# Drexel Univ., Philadelphia, Pa. Coll. of Information Studies.
EVALUATION OF THE NATIONAL LIBRARY OF MEDICINE'S PROGRAM IN THE MEDICAL BEHAVIOR SCIENCES. AN ANALYSIS OF THE NATIONAL LIBRARY OF MEDICINE'S (NLM) HANDLING OF MEDICAL BEHAVIORAL SCIENCES (MBS) LITERATURES: SOME RESEARCH TESTS OF METHODS FOR EVALUATING BIBLIOGRAPHIC DATABASES, EXECUTIVE SUMMARY Final Report
B. C. Griffith, H. D. White, M. C. Drott, and J. D. Saye Jan. 1984 39 p refs 6 Vol.
(Contract NO1-LM-23510)
(PB84-230481; NLM-82/302/ES) Avail: NTIS HC A03/MF A01; also available in set of 6 reports HC E99 as PB84-230473 CSCL 05K

The overall purpose of NLM 82-302 is to assess the adequacy of National Medical Library (NLM) programs in medical behavioral science and ancillary fields. This study focuses on assessing bibliographic services in order to provide a systematic approach to bibliographic service evaluation that can be used in the future as a routine method for regular review of NLM performance in this area. The project is a comparative evaluation of the adequacy of the online bibliographic search services of the Library. It compares the performance of MEDLARS with that of alternative databases and search systems. Findings are expected to lead to better informed policy decisions regarding literature coverage, indexing practices, and changes in the controlled vocabulary. GRA

N85-12803# International Trade Administration, Washington, D.C.
COMPETITIVE ASSESSMENT OF THE US INFORMATION SERVICES INDUSTRY Final Report
May 1984 77 p refs
(PB84-174804) Avail: NTIS HC A05/MF A01 CSCL 05B

An operational definition of the four principal segments of the information services industry in the United States: database development, on-line information services, document supply services, and customized search and abstracting services are discussed. Major domestic firms are identified along with a discussion of the current state of information services in Europe and Japan. Domestic markets and firms are discussed in terms of their characteristics and trends. Domestic and international competitive issues are identified. Return on investment is calculated for hypothetical data base development and on-line services projects, along with an analysis of the sensitivity of internal rate of return to changes in the most significant factors. Driving forces in the future of the industry are identified. A limited number of international and domestic options for maintaining the competitiveness of the domestic industry are discussed. Author

N85-12434# Institute of Oceanographic Sciences, Birkenhead (England). Marine Information and Advisory Service.
INTERNATIONAL BANKING OF SATELLITE AND IN-SITU WAVE DATA BY THE MARINE INFORMATION AND ADVISORY SERVICES (MIAS)
M. T. Jones and A. R. Tabor *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 91-98 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

N85-12435# Royal Aircraft Establishment, Farnborough (England).
FACTORS AFFECTING THE ARCHIVING, PROCESSING AND DISSEMINATION OF ERS-1 ALTIMETER DATA
A. Haskell *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 99-102 (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

N85-12452# Selenia S.p.A., Rome (Italy).
SIMULATION OF INFORMATION EXTRACTION FROM RADAR ALTIMETER RETURN ECHOES
G. Losquadro and R. Somma *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 187-192 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

N85-12455# University Coll., London (England). Mullard Space Science Lab.
STANDARDIZATION OF DATA FORMATS FOR RADAR ALTIMETER DATA
R. F. Scott and H. E. Huckle *In* ESA ERS-1 Radar Altimeter Data Prod. Aug. 1984 p 205-208 refs (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

N85-12457*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
LESSONS FROM THE SEASAT AND GEOS-3 ALTIMETERS DATA PROJECTS
M. E. Parke *In* ESA ERS-1 Radar Altimeter Data Products Aug. 1984 p 215-219 refs Sponsored by NASA (For primary document see N85-12419 03-43)
Avail: NTIS HC A12/MF A01

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

N85-12804# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

A STOCHASTIC MODEL FOR OPTIMIZING THE CONSUMPTION AND EXPLORATION OF NONRENEWABLE NATURAL RESOURCES [UM MODELO ESTCASTICO PARA OTIMIZACAO DO CONSUMO E EXPLORACAO DE UM RECURSO NATURAL NAO-RENOVAVEL]

Armando Zeferino Milioni and Paulo Renato deMorais Jun. 1983 20 p refs In PORTUGUESE; ENGLISH summary Presented at the 16th Simp. Brasileiro de Pesquisa Operacional, Florianapolis, Brazil, Oct. 1983

(INPE-2770-PRE/343) Avail: NTIS HC A02/MF A01

Deshmukh and Pliska's model, for optimally consuming a natural resource and exploring for new sources of supply of that resource, in the presence of uncertainties is applied to the case of optimal consumption and exploration of Brazilian oil. A numerical method was required to obtain an approximate solution to an integro-differential equation. Other problems studied are the effects on the optimal consumption and exploration policies caused by changes in parameters like: oil extraction costs, imported oil prices, maximum rate of oil extraction and investment on exploration for new sources of supply. Author

N85-12805# Army Missile Command, Redstone Arsenal, Ala.

ECONOMIC ANALYSIS HANDBOOK

J. L. Gossett Jun. 1984 60 p

(AD-A146263; USAMICOM-RR-84-15) Avail: NTIS HC A04/MF A01 CSCL 05/3

This effort is provided as an aid in the preparation of an economic analysis. Information extracted from various sources was identified in the references. Material and assistance were received from the US Army Armament, Munitions and Chemical Command. Contents are: Introduction, Documentation, Constant Dollars, Cost Analysis, Economic Life, Comparison and Ranking of Alternatives, Present Value of Money and Terminal Value. GRA

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

N85-12806*# National Aeronautics and Space Administration, Washington, D. C.

THE STRUCTURES AND THE ROLE OF AN INTERNATIONAL AGENCY FOR THE CONTROL OF SATELLITES

R. J. Dupuy Jun. 1984 13 p refs Transl. into ENGLISH from Ann. of Air and Space Law (Montreal), v. 6, 1981 p 333-341 Original language document was announced as A82-37836 Transl. by Kanner (Leo) Associates, Redwood City, Calif.

(Contract NASw-3541)

(NASA-TM-76765; NAS 1.15:76765) Avail: NTIS HC A02/MF A01 CSCL 05D

Legal questions involved in the liability of a proposed agency which would control internationally owned satellites for monitoring worldwide compliance with arms control agreements are discussed. Difficulties in acquiring the signed consent of all the relevant nations, and guaranteeing satisfactory compliance with the terms of such an agreement are noted. Additional problems to be solved comprise the construction of the ground based facilities and the satellites, the funding for the venture, and the reconciliation of the functions of the proposed agency with the sovereignty of individual states. The agency would gather, treat, and format data for signatories of arms control agreements and provide technical assistance in crisis conditions. It is concluded that the existence and functioning of the agency would reduce the amount of classified information and would consequently reduce the level of international tensions. E.A.K.

N85-12807# Committee on Government Operations (U. S. House).

FEDERAL TELECOMMUNICATIONS PRIVACY ACT OF 1984

Washington GPO 31 May 1984 19 p Rept. to accompany H.R. 4620 presented to the Comm. on Govt. Operations and the Comm. on Post Office and Civil Serv., 98th Congr., 2d Sess., 24 Jan. 1984

(H-Rept-98-815; GPO-35-126) Avail: US Capitol, House Document Room

The privacy act as it applies to Federal telecommunications was discussed. Prohibition of recording of conversations made on the Federal telecommunications system, and for other purposes is considered. It is concluded that the rule provides the necessary measure to ensure that Federal officers and employees do not resort to abusive practices of secretly recording telephone conversations. The bill provides the necessary exemptions for legitimate activities that are fully justified and/or authorized by current law. It is found that there is a distinction between recording conversations for law enforcement and other established purposes and the recording of conversations by Federal officials for their own use. E.A.K.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N85-12808*# Mechanical Technology, Inc., Latham, N. Y.

DEVELOPMENT OF GAS-LUBRICATED PISTONS FOR HEAVY DUTY DIESEL ENGINE TECHNOLOGY PROGRAM Final Report

Wilbur Shapiro Jul. 1984 192 p refs

(Contracts DEN3-309; DE-AI01-80CS-50194)

(NASA-CR-174746; NAS 1.26:174746; MTI-84TR58) Avail: NTIS HC A09/MF A01 CSCL 13F

Static testing of a segmented, gas-lubricated, piston-ring was accomplished. The ring utilizes high-pressure gas generated during the diesel cycle to energize a hydrostatic gas film between the piston and cylinder liner. The configuration was deficient in overall performance, because all segments of a ring set failed to form a fluid-film simultaneously, when exposed to internal preload. The difficulty was traced to the moment balance required to prevent the segments from overturning and contacting the cylinder walls. Some individual sectors formed a film and performed well in every respect including load capability to 6,000 N. These results produce optimism as to the ultimate feasibility of hydrostatic, gas-lubricated piston rings. In addition to test results, the principles of operation, and theoretical developments are presented. Breathable liner concepts are suggested for future consideration. In these configurations, solid hydrostatic pistons are coupled with flexible liners that elastically deform to form a gas-film under hydrostatic pressurization. Breathable liners afford the mechanical simplicity required for mass produced engines, and initial examination indicates satisfactory operation. Author

88 SPACE SCIENCES (GENERAL)

N85-12809# Royal Observatory, Edinburgh (Scotland).

STAR FORMATION WORKSHOP

R. D. Wolstencroft, ed. 1984 238 p refs Workshop held in Edinburgh, 4-6 Oct. 1983

(ROE-OR-13; ISSN-0309-099X) Avail: NTIS HC A11/MF A01

Giant molecular clouds and galactic protostars; interaction of the youngest stars with their environment; and extragalactic star formation were discussed. For individual titles, see N85-12810 through N85-12829.

N85-12810# Massachusetts Univ., Amherst. Five Coll. Radio Astronomy Observatory.
DISTRIBUTION AND PROPERTIES OF MOLECULAR CLOUDS IN THE GALAXY **c90**
N. Z. Scoville, D. B. Sanders, and D. P. Clemens *In* Royal Observatory Star Formation Workshop 1984 p 1-14 refs (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

The large scale distribution of molecular clouds as a function of galactic radius and azimuth, especially the cloud ring at 5 to 7 kpc radius is discussed. Emission region size, mass, and density are considered. The CO spiral structure is reviewed. A scenario with clouds forming at a constant rate, independent of the spiral arms is suggested. Once the cloud material is accumulated, stars of low mass form continuously. However, the spiral arms must mark the formation of more massive stars with greater potential to destroy and disrupt the clouds. The interarm regions might therefore contain a great number of molecular clouds, each of which is a fragment of the great complexes delineating the arms. Author (ESA)

N85-12811# Columbia Univ., New York.
THE NUMBER AND DISTRIBUTION OF MOLECULAR CLOUDS IN THE INNER GALAXY **c90**
P. Thaddeus (Cambridge Univ.) and T. M. Dame *In* Royal Observatory Star Formation Workshop 1984 p 15-26 refs (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

First and second quadrant CO surveys on the number and distribution of molecular clouds in the inner galaxy are summarized. The Perseus Arm is the best place to determine the statistical properties of molecular clouds or cloud complexes. The largest complexes in the inner galaxy are similar to those in the Perseus Arm in size, mass, and velocity dispersion. The kinematic distance ambiguity to these complexes can be resolved with the associated population I objects. There are pronounced departures from axisymmetry in the distribution of large clouds. The Sagitarrius Arm is particularly coherent over at least 120—deg in galactocentric azimuth. Many of the large clouds in the ring population at R = 4 to 7 kpc lie at the near kinematic distance. The mass of molecular clouds in the region R = 4 to 7 kpc is comparable to the atomic mass. There are a few hundred large molecular clouds or complexes in the inner galaxy. Author (ESA)

N85-12812# Edinburgh Univ. (Scotland). Dept. of Astronomy.
COMPACT INFRARED SOURCES: PROTOSTARS BEFORE IRAS **c92**
Peter Brand *In* Royal Observatory Star Formation Workshop 1984 p 27-29 refs (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

The difficulties in identifying protostars are reviewed, and the IRAS contribution to star formation is discussed. Wynn-Williams' defining properties for protostars are recalled, and associations of masers, high velocity CO, and shocked molecular hydrogen with compact infrared sources are pointed out. A dense, hot-centered cloud model is proposed to explain dust emission from these sources. Author (ESA)

N85-12813# Queen Mary Coll., London (England). Dept. of Physics.
IRAS OBSERVATIONS OF GALACTIC STAR FORMATION **c90**
Stella Harris, B. Baud (Groningen Univ., Netherlands), C. A. Beichmann (California Inst. of Tech., Pasadena, Calif.), and J. P. Emerson *In* Royal Observatory Star Formation Workshop 1984 p 31-36 refs (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

Star formation in the Milky Way Galaxy was studied using IRAS data for Barnard 5, the Her Haro (HH) object L1551, HH46 and 47 towards the Gum nebula, and a 1 square degree area of Chameleon 1. It is suggested that hot sources are unrelated field stars. Warm sources, (color temperatures around 100 K) occur predominantly at the center of the star-formation activity, in the densest part of the cloud, several being associated with known pre-main sequence objects. The remaining new ones have similar spectra over the IRAS range, but shorter wavelength observations are required to distinguish which of these are pre-main sequence stars and which belong to an even earlier collapse phase. Sources seen only at 60 and 100 microns lie on the outskirts of the main cloud and may be similar to dark globules. Author (ESA)

N85-12814# University Coll., London (England). Dept. of Physics and Astronomy.
FAR-INFRARED OBSERVATIONS OF SOME REGIONS OF STAR FORMATION **c89**
W. M. Glencross and J. F. Lightfoot *In* Royal Observatory Star Formation Workshop 1984 p 37-40 refs (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

Balloon-borne far infrared observations of the rho Ophiuchus Cloud and the Lagoon Nebula (M8) are summarized. There are several B-stars in the rho-Opiuchus cloud (the brighter FIR sources are each several hundred solar luminosities), but conditions favor the formation of many less-luminous objects. Examination of M8 in the far infrared shows very little emission from most of the Lagoon Nebula, but a fairly compact peak centered on the star Herschel 36. The stars forming the optical cluster NGC6530 dispersed much of the molecular material in front of Herschel 36, from which they were themselves formed. Although the remnant of their parent cloud exists behind Herschel 36, it is now too far away to be heated significantly by the cluster. Author (ESA)

N85-12815# Arizona Univ., Tucson. Steward Observatory.
OPEN CLUSTER FORMATION **c90**
Michael Margulis and Charles J. Lada *In* Royal Observatory Star Formation Workshop 1984 p 41-62 refs Sponsored by Alfred P. Sloan Foundation (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

Analytical and numerical models which describe the formation of bound clusters from a wide range of initial protocluster conditions are presented. Bound open cluster formation is shown to depend on star formation efficiency, gas removal time, and initial system mass density. Investigation of the rho Ophiuchus molecular cloud core is advocated. A calorimetric technique for determining the luminosity function of cluster members in the cloud is shown to be useful to obtain the luminosity function of an embedded cluster, and may be a way to study the time evolution of a cluster mass function. This method suggests a deficiency of intermediate mass stars in the rho Oph region, which may reveal how protostellar fragments grow into stars and on the mass dependence of the early stages of star formation. Author (ESA)

N85-12816# Goettingen Univ. (West Germany).
NUMERICAL MODELS OF THE SPECTRAL APPEARANCE OF PROTOSTELLAR ENVELOPES **c89**
H. W. Yorke *In* Royal Observatory Star Formation Workshop 1984 p 63-82 refs (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

Investigations of protostars using model fitting techniques, and construction of model grids is reviewed. An approach based on numerical hydrodynamical evolution equations coupled with radiation transport is outlined. The evolution of the envelope, its density and velocity structure are determined by physical equations, but to reduce computational complexity, assumptions are made. Boundary conditions, initial starting conditions, and detailed knowledge of dust properties are, however, needed. Such evolutionary calculations cannot be repeated for a wide range of parameters, and it is difficult to judge whether the final results depend sensitively on the assumptions made. If used with the first two approaches, though, the method provides valuable insight into the star formation process. The evolution and collapse of a 10 and 150M cloud are analyzed. Author (ESA)

N85-12817# Royal Observatory, Edinburgh (Scotland).
SPHERICAL ACCRETION ONTO A PROTOSTELLAR CORE **c90**
H. Zinnecker and W. M. Tscharnuter (Wien Univ.) *In its* Star

Formation Workshop 1984 p 83-90 refs (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

The results of an analytical calculation describing the temporal behavior of spherical accretion onto a hydrostatic protostellar core formed by nonhomologous collapse of a Jeans-unstable gaseous sphere are presented. It is found that in the late stages of accretion the core mass grows according to a hyperbolic tangent square law, in good agreement with numerical results. The results of a numerical calculation of spherical accretion onto a protostar embedded in a larger gas reservoir, in an attempt to relax the boundary condition that the total mass be constant, are reported. In this case the core mass grows linearly with time, in qualitative agreement with analytical results. Spherically-symmetric accretion onto a protostellar core is compared with spherically-symmetric accretion onto a point mass. Author (ESA)

N85-12818# Kent Univ., Canterbury (England). Electronics Lab.
RELATION OF CORE STRUCTURE TO HIGH VELOCITY OUTFLOW IN G35.2-0.74 AND OTHER MOLECULAR CLOUDS c90
L. T. Little *In* Royal Observatory Star Formation Workshop 1984 p 91-107 refs (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

Difficulties in estimating gas densities within molecular clouds are discussed, quoting observations of HH objects 24-26; confinement of high velocity gas flows by ambient cloud material is considered. Observations of the 400M cloud G35.2-0.74 are summarized. Author (ESA)

N85-12819# Royal Observatory, Edinburgh (Scotland). United Kingdom Infrared Telescope.
MOLECULAR HYDROGEN EMISSION ASSOCIATED WITH HIGH VELOCITY FLOWS. A TRACER FOR LOW VELOCITY SHOCKS c90
W. J. Zealey, P. M. Williams, J. Storey (New South Wales Univ., Australia), K. Taylor (New South Wales Univ., Australia), and G. Sandell (Helsinki Univ.) *In* Royal Observatory Star Formation Workshop 1984 p 109-115 refs Sponsored by Academy of Finland (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

The production of supersonic bipolar stellar winds by pre-main sequence stars was studied by observing H2 emission in the HH7-11 complex. Results show that H2 emission is clumped on a similar scale to that observed in visible emission, but that H2 and visible emission are not always coincident. In at least one case diffuse extended H2 emission is observed, possibly associated with the outflow. The H2 emission associated with HH 7, an extremely low excitation HH object, is coincident with the visible emission. This strongly implies that both emissions arise from a single cloudlet shock. Models used to predict visible emission line strengths do not include H2 emission in the cooling of such shocks. This may explain the anomalies in line strengths observed in HH 7. Author (ESA)

N85-12820# Manchester Univ., MacClesfield (England). Nuffield Radio Astronomy Lab.
MASERS ASSOCIATED WITH REGIONS OF RECENT STAR FORMATION c36
R. J. Cohen and P. R. Rowland *In* Royal Observatory Star Formation Workshop 1984 p 117-128 refs (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

Interstellar maser functioning and masing region structure were studied by observing H2O masers. Twenty-four H2O masers were monitored for 40 days and nights. Of 13 spectral features identified, only 3 stay constant over the 40 days. The Cep A H2O masers were mapped, revealing that the masers occur in 3 clusters which coincide with ultracompact HII regions. Measurements indicate that HII region 2 is the source of bipolar outflow in Cep A. Author (ESA)

N85-12821# Manchester Univ. (England). Dept. of Astronomy.
SHAPES OF WIND DRIVEN CIRCUMSTELLAR SHELLS c90
Franz Kahn and Kym West *In* Royal Observatory Star Formation Workshop 1984 p 129-132 refs Sponsored by UK Science and Engineering Research Council (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

A star formation model which allows for departures from spherical symmetry is proposed. The asphericity results from anisotropy in the distribution of mass loss from the progenitor star of a planetary nebula. Ambient gas of the slow wind is swept into a cool shell and driven outwards; fast wind gas is shocked, and forms a bubble of hot gas enclosed by this shell. The expansion speed of the cool shell is slow compared with the sound speed in the hot shocked wind. Therefore the pressure of the hot gas is (almost) uniform within the bubble. But there is more mass to push outwards in those directions where the ambient gas is denser, so the shell expands more slowly there, i.e., the shell is no longer spherical. Author (ESA)

N85-12822# Manchester Coll. of Science and Technology (England). Dept. of Mathematics.
TIME-DEPENDENT CHEMISTRY OF MOLECULAR CLOUDS c90
Graeme D. Watt *In* Royal Observatory Star Formation Workshop 1984 p 133-146 refs Sponsored by UK Science and Engineering Research Council (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

Time-dependent models of interstellar chemistry are summarized and difficulties in reaching theoretical quantities of fractional abundance from observations of antenna temperature of a spectral line versus line of sight radial velocity are emphasized. A time-dependent chemistry computer program is described. Modeling of the hot, cooling, post-shocked gas is outlined. The program was run on a Cray-1 computer. Author (ESA)

N85-12823# Royal Observatory, Edinburgh (Scotland).
THE ROTATION OF B-TYPE STARS AND PROCESSES OF STAR FORMATION c90
B. N. G. Guthrie *In its* Star Formation Workshop 1984 p 147-149 refs (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

The initial distribution of projected rotational velocities (v sin i) of late and early B stars is discussed as a means of studying star formation. Analysis shows that small values of v sin i are common among the members of the older subgroups of associations but not among the members of the youngest subgroups. This is difficult to explain, since the older subgroups are only 10 million years old. The stars in the older subgroups possibly shed angular momentum rapidly when they left the nebulosity in which they were embedded; alternatively the stars in the older subgroups formed in a different way from those in the youngest subgroups. Author (ESA)

N85-12824# Royal Observatory, Edinburgh (Scotland).
THE SIGNIFICANCE OF COMETS FOR STAR FORMATION c91
S. V. M. Clube *In its* Star Formation Workshop 1984 p 151-158 refs (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

The proposition that molecular clouds are dissipating systems containing large numbers of comets bearing a memory of recent galactocentric explosions is discussed. A super-dense state is not demanded, since the precursor state of the star-forming material in a galaxy is possibly a compact disk drawn from the central few hundred parsecs of the galaxy in which the redistribution of angular momentum produces the escape of spiral arms. The growth of a central disk is accompanied by a rapidly evolving central supermassive star. Explosive debris from such bodies may leave an imprint on cometary condensations as they form in the nuclear disk. This contamination could explain excess Li observed in the weakly processed material of meteorites, and young stars account for the sequence of nearby stellar explosions prior to Solar System formation, inferred from meteorites. Author (ESA)

N85-12825# Queen Mary Coll., London (England). Dept. of Physics.
IRAS OBSERVATIONS OF EXTERNAL GALAXIES c89
J. P. Emerson *In* Royal Observatory Star Formation Workshop 1984 p 159-175 refs (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

First IRAS results on normal galaxies are reviewed. Results include maps of M31 and a discussion of the IR properties of an optically selected and an infrared selected sample of galaxies. Late type spirals are most readily detected, whereas normal ellipticals are not seen at all in the far infrared. The ratio of far infrared (80 micron) to visual (B filter) luminosity ranges from 0.04 to 50, the large range reflecting both a variety of current star formation activity and a variety of dust optical depths. The galaxies with extremely high L(80)/L(B) are only a small fraction of all galaxies. Interactions between galaxies may be stimulating star burst activity. Lists of IRAS circular objects identified with galaxies are given. Author (ESA)

N85-12826# Imperial Coll. of Science and Technology, London (England). Blackett Lab.
STAR FORMATION IN INTERACTING GALAXIES c90
R. D. Joseph, W. P. S. Meikle, N. A. Robertson, and G. S. Wright *In* Royal Observatory Star Formation Workshop 1984 p 177-181 refs (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

The nuclei of interacting galaxies were investigated as sites of recent star formation activity. A JHKL survey of 45 interacting galaxies reveals that, for 85% of the sample, 1 member of an interacting pair has a K-L color index significantly redder than normal galaxy colors. These K-L excesses imply steeply-rising infrared spectra characteristic of thermal emission by dust and similar to the infrared spectra found for the nuclei of canonical starburst galaxies. This inference is supported by 10 to 20 micron photometry obtained for a few of these galaxies. Thus, interactions trigger bursts of star formation in the nuclei of galaxies with efficiency approaching 100%. Author (ESA)

N85-12827*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
INFRARED MAPPING OF GALAXIAN CENTERS: STAR FORMING REGIONS WITH KILOPARSEC SCALE SIZES c89
C. M. Telesco *In* Royal Observatory Star Formation Workshop 1984 p 183-198 refs (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

A 1 to 20 micron mapping of the centers of galaxies encompassing the regions that extend out to several kiloparsecs from the nuclei is reviewed. Power emerging at < or = 5 microns is a direct measure of the number of young stars present. This conclusion is strongly supported by the large-scale association of the infrared-emitting regions with visual continuum and line emission indicative of young stars, and by the similarity of the energy distributions to those of Galactic HII region/molecular cloud complexes. Much of the young-star activity is completely hidden from view. At shorter wavelengths, a variety of processes, including bremsstrahlung, are evident. Author (ESA)

N85-12828# Massachusetts Univ., Amherst. Five Coll. Radio Astronomy Observatory.
MOLECULES IN EXTERNAL GALAXIES c90
N. Z. Scoville *In* Royal Observatory Star Formation Workshop 1984 p 199-210 refs (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

Studies of the interstellar medium in late spiral galaxies are discussed. The one-to-one proportionality between H2 mass and optical luminosity as a function of radius and from galaxy to galaxy within a single morphological class suggests that the bulk of star formation may occur in molecular clouds independently of their location within the galaxy. The clouds are enormously massive, so if most of the star forming material is within them, it is well shielded and insulated from the external environment. The rate of star formation throughout most of a given cloud cannot therefore be easily influenced by external effects such as spiral shocks or even supernovae. However, formation of massive stars is correlated with spiral arms, suggesting that a fraction of the overall rate of star formation is triggered by the external environment. Author (ESA)

N85-12829# Royal Observatory, Edinburgh (Scotland).
FUTURE THEORETICAL NEEDS IN STUDIES OF STAR FORMATION c90
Hans Zinnecker *In its* Star Formation Workshop 1984 p 211-220 refs (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

Theoretical questions concerning processes before, during, and after star formation are listed. The origin and properties of binary and multiple stellar systems; reasons why most collapsing condensations tend to form binary stars while others form single objects like the Sun, possibly surrounded by a protoplanetary disk; and predicting the sequence of events of star formation in a given cloud with given bulk properties are considered. Author (ESA)

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N85-12830 Princeton Univ., N. J.
MEASUREMENT OF PULSAR PARALLAX BY VERY LONG BASELINE INTERFEROMETRY Ph.D. Thesis
Carl Ross Gwinn 1984 148 p
Avail: Univ. Microfilms Order No. DA8417421

The parallax of two pulsars were measured and absence of relative motion between members of pairs of quasars was observed with antennas and data recorders at Green Bank, WV, Owens Valley, CA, and Arecibo, PR. Recorded signals were processed to produce interference fringes, which were corrected for the effects of polar motion, the troposphere and the ionosphere. The fringe phases of each program source were then differenced with those of its reference, reducing residual systematic errors. Variations of this difference between epochs reflected program source proper motion and parallax. A parallax of 7.8 + or - was obtained 0.6 mas for PSR 0950 + 08, corresponding to a distance of 130 + or - 10 pc, and a parallax of 1.8 + or - 0.4 mas for PSR 0823 + 26, corresponding to a distance of 560 + or - 130 pc. In combination with published measurements of pulse dispersion for these pulsars, these yield average free electron densities of 0.023 + or - 0.002 cm/3 along the line of sight to PSR 0950 + 08 and 0.035 + or - 0.008 cm/3 along the line of sight to PSR 0950 + 08 and 0.035 + or - 26. These are in good agreement with free electron densities measured by other techniques along lines of sight 1 kpc or more in length. Both parallax measurements are subject to systematic errors. Dissert. Abstr.

N85-12831 Washington Univ., Seattle.
STUDIES OF EXTRAGALACTIC RR LYRAE STARS Ph.D. Thesis
James Michael Nemec 1984 330 p
Avail: Univ. Microfilms Order No. DA8419179

RR Lyrae stars in and around the LMC halo globular cluster NGC 2257 were identified and photometrically studied. The [Fe/H] was derived and was found to be -1.8 + or - 0.3. Mean magnitudes suggest that NGC 2257 is approximately 4 Kpc in front of the LMC disk. Period change rates, derived for 38 stars from observations spanning nearly 35 years, are significantly different for the ab- and c-type stars. The identification of two large amplitude, short period RRab stars suggests that the field around NGC 2257 contains stars of higher [Fe/H] than does the cluster. Ten double-model RR Lyrae (RRd) stars were identified in the Draco dwarf galaxy. Heat mass and metal abundance ranges were found. Real star-to-star luminosity variations are seen among

the Draco RR Lyraes, and evidence for a global metal abundance range among the RR Lyraes is presented. The mean periods of the Blazhko amplitude variables in Draco and in six Galactic globular clusters are shown to be significantly shorter than the mean periods of the non-Blazhko variables in the same systems. Dissert. Abstr.

N85-12832*# Minnesota Univ., Minneapolis.
SPECTRAL COMPONENTS AT VISUAL AND INFRARED WAVELENGTHS IN ACTIVE GALACTIC NUCLEI
W. A. Stein, A. T. Tokunaga (Hawaii Univ.), and R. J. Rudy (Arizona Univ.) [1984] 18 p refs
(Contract NASw-3159)
(NASA-CR-174133; NAS 1.26:174133) Avail: NTIS HC A02/MF A01 CSCL 03A

Aperture-dependent infrared photometry of active galactic nuclei are presented which illustrate the importance of eliminating starlight of the galaxy in order to obtain the intrinsic spectral distribution of the active nuclei. Separate components of emission are required to explain the infrared emission with a spectral distribution of the active nuclei. Separate components of emission are required to explain the infrared emission with a spectral index of alpha approx = 2 and the typical visual-ultraviolet continuum with alpha approx = 0.3 (where F(nu) varies as nu(sup-alpha). Present evidence does not allow one to uniquely determine the appropriate mechanisms, but the characteristics of each are discussed. M.G.

N85-12833*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
ALGORITHM FOR ASTRONOMICAL, EXTENDED SOURCE, SIGNAL-TO-NOISE RADIO CALCULATIONS
R. R. Jayroe Nov. 1984 23 p refs
(NASA-TP-2396; NAS 1.60:2396) Avail: NTIS HC A02/MF A01 CSCL 03A

An algorithm was developed to simulate the expected signal-to-noise ratio as a function of observation time in the charge coupled device detector plane of an optical telescope located outside the Earth's atmosphere for an extended, uniform astronomical source embedded in a uniform cosmic background. By choosing the appropriate input values, the expected extended source signal-to-noise ratios can be computed for the Hubble Space Telescope using the Wide Field/Planetary Camera science instrument. Author

N85-12834*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
ALGORITHM FOR ASTRONOMICAL, POINT SOURCE, SIGNAL TO NOISE RATIO CALCULATIONS
R. R. Jayroe and D. J. Schroeder (Beloit Coll.) Nov. 1984 40 p refs
(NASA-TP-2397; NAS 1.60:2397) Avail: NTIS HC A03/MF A01 CSCL 03A

An algorithm was developed to simulate the expected signal to noise ratios as a function of observation time in the charge coupled device detector plane of an optical telescope located outside the Earth's atmosphere for a signal star, and an optional secondary star, embedded in a uniform cosmic background. By choosing the appropriate input values, the expected point source signal to noise ratio can be computed for the Hubble Space Telescope using the Wide Field/Planetary Camera science instrument. Author

N85-12835*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AN INFRARED STUDY OF THE BI-POLAR OUTFLOW REGION GGD 12-15
Paul M. Harvey, Bruce A. Wilking, Marshall Joy, and Daniel F. Lester Oct. 1984 29 p refs
(NASA-TM-86655; Rept-85017; NAS 1.15:86655; Preprint-24) Avail: NTIS HC A03/MF A01 CSCL 03A

Infrared observations from 1 to 100 microns are presented for the region associated with a bipolar CO outflow source near the nebulous objects GGD 12 to 15. A luminous far-infrared source was found associated with a radio-continuum source in the area. This object appears to be a compact HII region around a nearly main-sequence BO star. A faint 20 micron source was also discovered at the position of an H2O maser 3O deg northwest of the HII region. This object appears to be associated with but not coincident with a 2 micron reflection nebula. This structure serves as evidence for a non-spherically symmetric, possibly disk-like dust distribution around the exciting star for the maser. This object probably powers the bi-polar CO outflow although its luminosity is less than 10% that of the star which excites the compact HII region. A number of other 2 micron sources found in the area are probably members of a recently formed cluster. R.S.F.

N85-12836*# Arizona Univ., Tucson.
THE JOVIAN ATMOSPHERIC WINDOW AT 2.7 MICRONS: A SEARCH FOR H2S
Harold P. Larson, D. Scott Davis, Reiner Hofmann (Max-Planck-Inst. fuer Physik and Astrophysik, Munich), and Gordon L. Bjoraker Nov. 1984 50 p refs
(NASA-TM-86661; NAS 1.15:86661; Rept-85043) Avail: NTIS HC A03/MF A01 CSCL 03A

The atmospheric transmission window at 2.7 microns in Jupiter's atmosphere was observed at a spectral resolution of 0.1/cm from the Kuiiper Airborne Observatory. From an analysis of the CH4 abundance (80 m-am) and the H2O abundance (< 0.0125 cm-am) it was determined that the penetration depth of solar flux at 2.7 microns is near the base of the NH3 cloud layer. The upper limit to H2O at 2.7 microns and other results suggest that photolytic reactions in Jupiter's lower troposphere may not be as significant as was previously thought. A search for H2S in Jupiter's atmosphere yielded an upper limit of 0.1 cm-am. The corresponding limit to the element abundance ratio [S]/[H] was approx. 1.7x10(-8), about 10(-3) times the solar value. Upon modeling the abundance and distribution of H2S in Jupiter's atmosphere it was concluded that, contrary to expectations, sulfur-bearing chromophores are not present in significant amounts in Jupiter's visible clouds. Rather, it appears that most of Jupiter's sulfur is locked up as NH4SH in a lower cloud layer. Alternatively, the global abundance of sulfur in Jupiter may be significantly depleted. M.G.

N85-12191# Joint Publications Research Service, Arlington, Va.
FRENCH, SOVIETS DECIDE TO LAUNCH SIGMA SPACE TELESCOPE
In its West Europe Rept.: Sci. and Technol., No. 166 (JPRS-84845) 30 Nov. 1983 p 3-5 Transl. into ENGLISH from AFP Sci. (Paris), 6 Oct. 1983 p 11-12 (For primary document see N85-12190 03-31)
Avail: NTIS HC A05/MF A01

N85-12814# University Coll., London (England). Dept. of Physics and Astronomy.
FAR-INFRARED OBSERVATIONS OF SOME REGIONS OF STAR FORMATION
W. M. Glencross and J. F. Lightfoot *In* Royal Observatory Star Formation Workshop 1984 p 37-40 refs (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

N85-12816# Goettingen Univ. (West Germany).
NUMERICAL MODELS OF THE SPECTRAL APPEARANCE OF PROTOSTELLAR ENVELOPES
H. W. Yorke *In* Royal Observatory Star Formation Workshop 1984 p 63-82 refs (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

N85-12825# Queen Mary Coll., London (England). Dept. of Physics.
IRAS OBSERVATIONS OF EXTERNAL GALAXIES
J. P. Emerson *In* Royal Observatory Star Formation Workshop 1984 p 159-175 refs (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

N85-12827*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
INFRARED MAPPING OF GALAXIAN CENTERS: STAR FORMING REGIONS WITH KILOPARSEC SCALE SIZES
C. M. Telesco *In* Royal Observatory Star Formation Workshop 1984 p 183-198 refs (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N85-12837 Minnesota Univ., Minneapolis.
BIPOLAR MOLECULAR OUTFLOWS: T TAURI STARS AND HERBIG-HARO OBJECTS Ph.D. Thesis
Seung-Urn Choe 1984 125 p
Avail: Univ. Microfilms Order No. DA8418459

The relations of Herbig-Haro objects to the observed bipolar molecular outflows with T Tauri stars are studied. An evaporation disk model is proposed to obtain the shape of the disk where gas evaporates and to explain the collimation of the central T Tauri wind. In this case the collimation angle is about 10 deg. The collimated T Tauri wind making a form of a de Laval nozzle viscously interacts with the surrounding medium. This interaction enhances the second collimation (about 40 deg) of the resulting flow, mixing stellar and disk winds with external molecular gas. These viscous outflows are observed in the bipolar molecular outflow of the T Tauri stars. It is also proposed in the model that a Kelvin-Helmholtz instability in the throat of the de Lavel nozzle produces clumps, which can be accelerated by the ram pressure of the collimated wind up to the wind speed. The clumps eventually pass through a shock in the outflow, which results from its encounter with the ambient cloud. The clumps are then moving faster than the surrounding flow. These clumps are identified with Herbig-Haro objects. Dissert. Abstr.

N85-12838 Wisconsin Univ., Madison.
DUST PROPERTIES DETERMINED FROM BACKSCATTERING IN THE INTERPLANETARY AND INTERSTELLAR MEDIUM Ph.D. Thesis
Roy V. Myers 1984 135 p
Avail: Univ. Microfilms Order No. DA8413266

The structure and composition of comet dust were investigated through the dependence of polarization and angular albedo as a function of phase angle. Polarization measurements over wide ranges of phase angle were made for three comets. Data from two comets confirm that the position angle of the polarization lies parallel to the scattering plane at small phase angles. All polarization data of comets at small phase angles were merged to show that the angular dependence of polarization repeats from comet to comet. Correlations between asteroid polarization and geometric albedo, when applied to comets, gives values of the comet geometric albedo less than 0.1 and provides an explanation of the similarity of polarization curves among comets. Infrared observations of the reflected solar spectrum and the dust thermal spectrum allowed a determination of the angular albedo of comet dust. The angular albedo at all phase angles describes the dust phase functions. Dissert. Abstr.

N85-12839*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
X-RAY OBSERVATIONS OF THE SEYFERT 1 GALAXIES AKN120 AND MCG8-11-11
R. F. Mushotzky and F. E. Marshall Mar. 1980 21 p refs Previously announced as A80-49367 Submitted for publication
(NASA-TM-80663; NAS 1.15:80663) Avail: NTIS HC A02/MF A01 CSCL 03B

A new X-ray source, H0523-00, with the optically variable Seyfert 1 galaxy AKN 120 is identified. The source has a 2-10 keV X-ray flux of 2 x 10 to the -11th ergs/sq cm s which corresponds to a 2-10 keV X-ray luminosity of 10 to the 44th ergs/s. X-ray observations over a 1.5 year time span combined with contemporaneous optical photometry show a decrease in the optical with no corresponding decrease in the X-ray. In contrast, similar observations of MCG 8-11-11 show a contemporaneous decrease in optical and X-ray fluxes. It is noted that the infrared and X-ray spectral slopes for these two objects are similar, with the optical being steeper by roughly one unit. Author (IAA)

N85-12840*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ON SYNTHESES OF THE X-RAY BACKGROUND WITH POWER-LAW SOURCES
G. DeZotti, E. A. Boldt, A. Cavaliere, L. Danese, A. Franceschini, F. E. Marshall, J. H. Swank, and A. E. Szymkowiak Aug. 1981 22 p refs Previously announced as A82-25055 Submitted for publication
(NASA-TM-82173; NAS 1.15:82173) Avail: NTIS HC A02/MF A01 CSCL 03B

The conditions under which the combined emission from power law sources can mimic the X-ray background (XRB) spectrum in the 3-50 keV range are considered in view of HEAO 1 A-2 experiment measurements, and it is confirmed that a good fit may be obtained. The required spectral properties of the component sources differ, however, from those observed for local active galactic nuclei. Constraints are deduced for both the low luminosity extension and evolution of such local objects, and it is shown that any other class of sources contributing to the X-ray background must be characterized by an energy spectral index lower than about 0.4, which is the mean index of the XRB, and exhibit sleeper spectra at higher energies. O.C. (IAA)

N85-12841*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A LARGE SCALE HEIGHT GALACTIC COMPONENT OF THE DIFFUSE 2-60 keV BACKGROUND
D. Iwan, F. E. Marshall, E. A. Boldt, R. F. Mushotzky, R. A. Shafer, and A. Stottlemyer Mar. 1982 47 p refs Previously announced as A84-42687 Submitted for publication
(NASA-TM-83837; NAS 1.15:83837) Avail: NTIS HC A03/MF A01 CSCL 03B

The diffuse 2-60 keV X-ray background has a galactic component clearly detectable by its strong variation with both galactic latitude and longitude. This galactic component is typically 10 percent of the extragalactic background toward the galactic center, half that strong toward the anticenter, and extrapolated to a few percent of the extragalactic background toward the galactic poles. It is acceptably modeled by a finite radius emission disk with a scale height of several kiloparsecs. The averaged galactic spectrum is best fitted by a thermal spectrum of kT about 9 keV, a spectrum much softer than the about 40 keV spectrum of the extragalactic component. The most likely source of this emission is low luminosity stars with large scale heights such as subdwarfs. Inverse Compton emission from GeV electrons on the microwave background contributes only a fraction of the galactic component unless the local cosmic ray electron spectrum and intensity are atypical. Author (IAA)

N85-12842*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE X-RAY SPECTRUM AND TIME VARIABILITY OF NARROW EMISSION LINE GALAXIES
R. F. Mushotzky Nov. 1981 41 p refs Previously announced as A82-31356 Submitted for publication
(NASA-TM-83859; NAS 1.15:83859) Avail: NTIS HC A03/MF A01 CSCL 03B

X-ray spectral and temporal observations are reported for six narrow emission line galaxies (NELGs), all of which are fitted by power-law X-ray spectra of energy slope 0.8 and have column densities in the line of sight greater than 1 x 10 to the 22nd atoms/sq cm. Three of the objects, NGC 526a, NGC 2110 and MCG-5-23-16 are variable in their X-ray flux, and the latter two,

along with NGC 5506 and NGC 7582, showed detectable variability in at least one observation. The measured X-ray properties of these NELGs, which also included NGC 2992, strongly resemble those of previously-measured type 1 Seyferts of the same X-ray luminosity and lead to the conclusion of great similarity between the NELGs and low-luminosity type 1 Seyferts. The implications of these observations for the optical line-emitting region structure of these galaxies are discussed. O.C. (IAA)

N85-12843*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EINSTEIN SOLID STATE SPECTROMETER OBSERVATION OF THE PECULIAR RED DWARF WOLF 630 AB
Jean H. Swank and Hugh M. Johnson Jun. 1982 18 p refs Previously announced as A82-41999 Submitted for publication (NASA-TM-83947; NAS 1.15:83947) Avail: NTIS HC A02/MF A01 CSCL 03B

Wolf 630 AB is a double and perhaps triple star with a predominant dM 3.5e spectrum. It is one of the relatively strong red dwarf X-ray sources. The 0.5 to 4 keV spectral data for a steady, non-flaring flux are interpreted in terms of emission from thin thermal plasma with a dominant temperature of approximately 6,500,000 K. Both in temperature and average surface flux the quiescent corona is similar to that of the low temperature component found for RS Canum Venaticorum binaries. There is an indication of additional emission above 10 to the 7th power K, but the ratio of high to low temperature emission is smaller than for typical RS CVn systems. The solid state spectrometer observed the spectrum of only one other red dwarf, Ad Leo, which is very similar to that observed for Wolf 630 AB. R.S.F.

N85-12844# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
SPACE RESEARCH AND THE NEW APPROACH TO THE MECHANICS OF FLUID MEDIA IN COSMOS
Hannes Alfven and Franz Cech Jul. 1984 67 p refs Presented at 16th Intern. Congr. of Theoret. and Appl. Mech. Lingry, Denmark, 19-25 Aug. 1984 and Plasma Astrophys. Course and Workshop, Varenna, Italy 28 Aug.-7 Sep. 1984 Sponsored by Swedish Natural Science Research Council
(TRITA-EPP-84-04; ISSN-0348-7539) Avail: NTIS HC A04/MF A01

The contribution of spacecraft hardware to astronomy and astrophysics is discussed. Data from infrared, ultraviolet, X-ray and gamma ray instruments revealed that the cosmic environment consists, almost totally, of magnetized, often dusty, plasma. In situ measurements in the magnetospheres - including heliosphere - combined with laboratory experiments gave information about the properties of cosmic plasmas which makes necessary a drastic revision of the classical theory of plasmas. The results are applied to cosmogony. Magnetospheric physics has matured to such an extent that it is possible to treat certain aspects of cosmogony as an extrapolation of magnetospheric physics. It is shown that certain events 4 to 5 billion years ago can be reconstructed with an accuracy of a few percent. Author (ESA)

N85-12810# Massachusetts Univ., Amherst. Five Coll. Radio Astronomy Observatory.
DISTRIBUTION AND PROPERTIES OF MOLECULAR CLOUDS IN THE GALAXY
N. Z. Scoville, D. B. Sanders, and D. P. Clemens *In* Royal Observatory Star Formation Workshop 1984 p 1-14 refs (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

N85-12811# Columbia Univ., New York.
THE NUMBER AND DISTRIBUTION OF MOLECULAR CLOUDS IN THE INNER GALAXY
P. Thaddeus (Cambridge Univ.) and T. M. Dame *In* Royal Observatory Star Formation Workshop 1984 p 15-26 refs (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

N85-12813# Queen Mary Coll., London (England). Dept. of Physics.
IRAS OBSERVATIONS OF GALACTIC STAR FORMATION
Stella Harris, B. Baud (Groningen Univ., Netherlands), C. A. Beichmann (California Inst. of Tech., Pasadena, Calif.), and J. P. Emerson *In* Royal Observatory Star Formation Workshop 1984 p 31-36 refs (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

N85-12815# Arizona Univ., Tucson. Steward Observatory.
OPEN CLUSTER FORMATION
Michael Margulis and Charles J. Lada *In* Royal Observatory Star Formation Workshop 1984 p 41-62 refs Sponsored by Alfred P. Sloan Foundation (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

N85-12817# Royal Observatory, Edinburgh (Scotland).
SPHERICAL ACCRETION ONTO A PROTOSTELLAR CORE
H. Zinnecker and W. M. Tscharnuter (Wien Univ.) *In its* Star Formation Workshop 1984 p 83-90 refs (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

N85-12818# Kent Univ., Canterbury (England). Electronics Lab.
RELATION OF CORE STRUCTURE TO HIGH VELOCITY OUTFLOW IN G35.2-0.74 AND OTHER MOLECULAR CLOUDS
L. T. Little *In* Royal Observatory Star Formation Workshop 1984 p 91-107 refs (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

N85-12819# Royal Observatory, Edinburgh (Scotland). United Kingdom Infrared Telescope.
MOLECULAR HYDROGEN EMISSION ASSOCIATED WITH HIGH VELOCITY FLOWS. A TRACER FOR LOW VELOCITY SHOCKS
W. J. Zealey, P. M. Williams, J. Storey (New South Wales Univ., Australia), K. Taylor (New South Wales Univ., Australia), and G. Sandell (Helsinki Univ.) *In* Royal Observatory Star Formation Workshop 1984 p 109-115 refs Sponsored by Academy of Finland (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

N85-12821# Manchester Univ. (England). Dept. of Astronomy.
SHAPES OF WIND DRIVEN CIRCUMSTELLAR SHELLS
Franz Kahn and Kym West *In* Royal Observatory Star Formation Workshop 1984 p 129-132 refs Sponsored by UK Science and Engineering Research Council (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

N85-12822# Manchester Coll. of Science and Technology (England). Dept. of Mathematics.
TIME-DEPENDENT CHEMISTRY OF MOLECULAR CLOUDS
Graeme D. Watt *In* Royal Observatory Star Formation Workshop 1984 p 133-146 refs Sponsored by UK Science and Engineering Research Council (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

N85-12823# Royal Observatory, Edinburgh (Scotland).
THE ROTATION OF B-TYPE STARS AND PROCESSES OF STAR FORMATION
B. N. G. Guthrie *In its* Star Formation Workshop 1984 p 147-149 refs (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

N85-12826# Imperial Coll. of Science and Technology, London (England). Blackett Lab.
STAR FORMATION IN INTERACTING GALAXIES
R. D. Joseph, W. P. S. Meikle, N. A. Robertson, and G. S. Wright *In* Royal Observatory Star Formation Workshop 1984 p 177-181 refs (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

N85-12828# Massachusetts Univ., Amherst. Five Coll. Radio Astronomy Observatory.
MOLECULES IN EXTERNAL GALAXIES
N. Z. Scoville *In* Royal Observatory Star Formation Workshop 1984 p 199-210 refs (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

N85-12829# Royal Observatory, Edinburgh (Scotland).
FUTURE THEORETICAL NEEDS IN STUDIES OF STAR FORMATION
Hans Zinnecker *In its* Star Formation Workshop 1984 p 211-220 refs (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights. For spacecraft design see *18 Spacecraft Design Testing, and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

N85-12845 Virginia Univ., Charlottesville.
CHARGED PARTICLE EROSION OF ICY SATELLITES: CORONAL ATMOSPHERES AND SURFACE REDISTRIBUTION Ph.D. Thesis
Edwin Merrell Sieveka 1984 165 p
Avail: Univ. Microfilms Order No. DA8416400

Three aspects of the interaction between planetary satellites and charged particles trapped in the magnetic field of the parent planet are studied through the use of Monte Carlo model calculations. Currently available data from observations of the satellites of Jupiter and Saturn obtained by the Pioneer and Voyager spacecraft and by Earth-based instruments are compared. The role of magnetospheric-ion bombardment of volatile ices (H2O and SO2) as a surface erosion and redistribution mechanism is examined. Such observed features as polar frost caps on Ganymede and sulfur implantation on Europa is explained by the erosion/deposition model developed. The model is extended to calculate the contribution made by particles sputtered from the surface of a satellite to an atmospheric corona. Calculations of coronal densities are performed for non-isotropic ion bombardment and compared to a semi-analytical calculation for an isotropic incident flux. Dissert. Abstr.

N85-12846 Johns Hopkins Univ., Baltimore, Md.
TEMPORAL AND SPATIAL VARIATIONS IN THE INTENSITY OF ULTRAVIOLET EMISSIONS FROM JUPITER AND THE Io TORUS Ph.D. Thesis
Thomas Edmund Skinner 1984 104 p
Avail: Univ. Microfilms Order No. DA8414299

Observations of Jupiter and the Io torus were made using the International Ultraviolet Explorer (IUE) satellite beginning in December and extending through July 1983. A long term stability is seen in the intensities of resonantly scattered solar Lyman alpha and auroral emissions from the planet and in the intensities of emissions from ionized sulphur in the torus. Short term factor of approximately 2 variations in the intensity of a given emission are not unusual, however. The temporal behavior of the emissions is consistent with suggested links between the Io torus, auroral activity, solar Lyman alpha output, and the H column abundance of the upper atmosphere. Spatial variations in the disk Lyman alpha and auroral emissions are also seen. Dissert. Abstr.

N85-12847*# Massachusetts Univ., Amherst. Dept. of Geology and Geography.
MARTIAN IMPACT BASINS: MORPHOLOGY DIFFERENCES AND TECTONIC PROVINCES
Marrianne Stam, Peter M. Schultz (Lunary and Planetary Inst.), and George E. McGill Aug. 1984 2 p refs
(Contract NASw-3389)
(NASA-CR-174074; NAS 1.26:174074; LPI-CONTRI-537) Avail: NTIS HC A02/MF A01 CSCL 03B

Detailed geomorphic and structural mapping of five Martian basins and preliminary study of eleven other basins reveal four characteristic styles of modification that relate to the degree and age of past tectonic activity. Within regions that exhibit no evidence for tectonic activity, the modification style can be used to distinguish areas dominated by different exogenic processes. A framework for understanding these different styles of basin modification is provided. R.S.F.

N85-12848*# Houston Univ., Tex. Dept. of Geosciences.
MULTISPECTRAL AND GEOMORPHIC STUDIES OF PROCESSED VOYAGER 2 IMAGES OF EUROPA
Thomas A. Meier Aug. 1984 2 p refs Presented at the 47th Ann. Meteoritical Society Meeting, 30 Jul. - 2 Aug. 1984
(Contract NASw-3389)
(NASA-CR-174075; NAS 1.26:174075; LPI-CONTRI-537) Avail: NTIS HC A02/MF A01 CSCL 03B

High resolution images of Europa taken by the Voyager 2 spacecraft were used to study a portion of Europa's dark lineations and the major white line feature Agenor Linea. Initial image processing of images 1195J2-001 (violet filter), 1198J2-001 (blue filter), 1201J2-001 (orange filter), and 1204J2-001 (ultraviolet filter) was performed at the U.S.G.S. Branch of Astrogeology in Flagstaff, Arizona. Processing was completed through the stages of image registration and color ratio image construction. Pixel printouts were used in a new technique of linear feature profiling to compensate for image misregistration through the mapping of features on the printouts. In all, 193 dark lineation segments were mapped and profiled. The more accurate multispectral data derived by this method was plotted using a new application of the ternary diagram, with orange, blue, and violet relative spectral reflectances serving as end members. Statistical techniques were then applied to the ternary diagram plots. The image products generated at LPI were used mainly to cross-check and verify the results of the ternary diagram analysis. Author

N85-12849*# New York Univ., New York. Dept. of Applied Science.
THE MARTIAN CLIMATE: ENERGY BALANCE MODELS WITH CO2/H2O ATMOSPHERES Semiannual Status Report, 1 Mar. - 1 Sep. 1984
Martin I. Hoffert 1 Sep. 1984 11 p refs
(Grant NAGw-573)
(NASA-CR-174073; NAS 1.26:174073) Avail: NTIS HC A02/MF A01 CSCL 03B

Progress in the development of a multi-reservoir, time dependent energy balance climate model for Mars driven by prescribed insolation at the top of the atmosphere is reported. The first approximately half-year of the program was devoted to assembling and testing components of the full model. Specific accomplishments were made on a longwave radiation code, coupling seasonal solar input to a ground temperature simulation, and conceptualizing an approach to modeling the seasonal pressure waves that develop in the Martian atmosphere as a result of sublimation and condensation of CO2 in polar regions. R.S.F.

N85-12850*# Stanford Univ., Calif. Div. of Applied Mechanics.
MAGNETOHYDRODYNAMIC AND GASDYNAMIC THEORIES FOR PLANETARY BOW WAVES
John R. Spreiter and Stephen S. Stahara (RM Associates, Inc.) [1984] 71 p refs
(Grant NAGw-2781)
(NASA-CR-174132; NAS 1.26:174132) Avail: NTIS HC A04/MF A01 CSCL 03B

The observed properties of bow waves and the associated plasma flows are outlined, along with those features identified that can be described by a continuum magnetohydrodynamic flow theory as opposed to a more detailed multicomponent particle and field plasma theory. The primary objectives are to provide an account of the fundamental concepts and current status of the

magnetohydrodynamic and gas dynamic theories for solar wind flow past planetary bodies. This includes a critical examination of: (1) the fundamental assumptions of the theories; (2) the various simplifying approximations introduced to obtain tractable mathematical problems; (3) the limitations they impose on the results; and (4) the relationship between the results of the simpler gas dynamic-frozen field theory and the more accurate but less completely worked out magnetohydrodynamic theory. Representative results of the various theories are presented and compared. A number of deficiencies, ambiguities, and suggestions for improvements are discussed, and several significant extensions of the theory required to provide comparable results for all planets, their satellites, and comets are noted. M.G.

N85-12851*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
STUDIES OF THE CHEMISTRY OF VIBRATIONALLY AND ELECTRONICALLY EXCITED SPECIES IN PLANETARY UPPER ATMOSPHERES Final Report, 1 Oct. 1983 - 30 Sep. 1984
Jane L. Fox Nov. 1984 30 p refs
(Grant NAGw-506)
(NASA-CR-174134; NAS 1.26:174134) Avail: NTIS HC A03/MF A01 CSCL 03B

The vibrational distribution of O2(+) in the atmospheres of Venus and Mars was investigated to compare with analogous values in the Earth's atmosphere. The dipole moment of the Z(2) Pi sub u - X(2) Pi sub g transition of O2(+) is calculated as a function of internuclear distance. The band absorption oscillator strengths and band transition probabilities of the second negative system are derived. The vibrational distribution of O2(+) in the ionosphere of Venus is calculated for a model based on data from the Pioneer Venus neutral mass spectrometer. R.S.F.

N85-12824# Royal Observatory, Edinburgh (Scotland).
THE SIGNIFICANCE OF COMETS FOR STAR FORMATION
S. V. M. Clube *In its* Star Formation Workshop 1984 p 151-158 refs (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N85-12852# Alabama Univ., Huntsville.
VECTOR MAGNETIC FIELD ANALYSIS OF LORENTZ FORCES ACTING IN THE SOLAR ATMOSPHERE Final Report, 3 Dec. 1981 - 31 Jul. 1983
K. Krall, S. T. Wu, and J. B. Smith, Jr. 28 Nov. 1983 42 p
(Contract F19628-82-K-0014)
(AD-A145941; AFGL-TR-83-0314) Avail: NTIS HC A03/MF A01 CSCL 03/2

The role of magnetic fields during the energy storage and release process of the solar chromosphere/corona is addressed in the absence of detailed chromospheric field measurements. The potential utility of 3-component solar photospheric magnetic field measurements in determining the magnetic energy transfer to the overlying atmosphere is examined. Net Lorentz forces and torques exerted on the volume above the photospheric plane are determined for a specific MSFC (Marshall Space Flight Center), Vector Magnetograph measurement set. Twenty-four trends during photospheric magnetic simplification appear consistent with a decline in energy transfer to the chromosphere. Noise within the data is found to be insignificant, while calibration uncertainties are large. An algorithm listing is provided. Keywords include: Flares, and Energy buildup. GRA

N85-12853# Los Alamos Scientific Lab., N. Mex.
EFFECTS OF CORE MIXING ON SOLAR OSCILLATION FREQUENCIES
A. N. Cox and R. B. Kidman 27 Jul. 1984 5 p refs Presented at 25th Leige Intern. Astrophys. Colloq., Leige, 10 Jul. 1984
(Contract W-7405-eng-36)
(DE84-015540; LA-UR-84-2448; CONF-840779-1) Avail: NTIS HC A02/MF A01

This paper discusses predicted p- and g-mode periods for two solar models provided by Schatzman and Maeder (1981). One model has no mixing while the other has turbulent diffusion mixing (allowed for by a Reynolds number of 100). The resulting g-mode period spacings allow a very close look at the central solar structure which, like the p-mode period splittings, indicate little or no mixing over the lifetime of the Sun. DOE

N85-12812# Edinburgh Univ. (Scotland). Dept. of Astronomy.
COMPACT INFRARED SOURCES: PROTOSTARS BEFORE IRAS
Peter Brand *In* Royal Observatory Star Formation Workshop 1984 p 27-29 refs (For primary document see N85-12809 03-88)
Avail: NTIS HC A11/MF A01

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N85-12854 Pennsylvania Univ., Philadelphia.
DYNAMICAL MODELS FOR RADIO JETS Ph.D. Thesis
Javad Siah 1984 146 p
Avail: Univ. Microfilms Order No. DA8417362

The observed prevalence of one-sided jets, on both parsec and multi-kiloparsec scales in extragalactic radio sources, and the excellent collimation of radio jets in general provided the motivation for this research. The basic framework for all of the numerical models described is the Twin Beam picture, where it is assumed that a continuous supply of energy in the form of relativistic plasma is spewed out of a galactic nucleus. This hot plasma tends to escape along the paths of least resistance (usually the rotation axes) through a cooler gas cloud which settles into the galactic nucleus and confines the emerging plasma. The approach used, while not a full hydrodynamical code, represents the evolution of the boundary between these two fluids quite well. Dissert. Abstr.

N85-12855*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
COSMIC RAY PROPAGATION IN THE LOCAL SUPERBUBBLE
R. E. Steitmatter, V. K. Balasubrahmanyan, R. J. Protheroe, and J. F. Ormes Sep. 1984 32 p refs Submitted for publication
(NASA-TM-85030; NAS 1.15:85030) Avail: NTIS HC A03/MF A01 CSCL 03B

It is suggested that a ring of HI gas lying in the galactic plane is part of a supershell which formed some 3 x to the 7th power years ago. The consequences of a closed magnetic supershell for cosmic ray propagation are examined and it is concluded that there is no evidence which precludes the production and trapping of cosmic rays in such a region. A consequence of superbubble confinement is that the mean age of cosmic rays would be independent of energy. This can be tested by high energy observations of the isotopic composition of Be. R.S.F.

99 GENERAL

N85-12856# Illinois Univ., Urbana. Coordinated Science Lab.
[RESEARCH ACTIVITIES OF THE ILLINOIS UNIVERSITY COORDINATED SCIENCE LABORATORY]
T. N. Trick Aug. 1984 171 p
(Contracts N00014-79-C-0424; N00014-84-C-0149; Grants AF-AFOSR-0317-82; AF-AFOSR-0054-84)

(AD-A145589) Avail: NTIS HC A08/MF A01 CSCL 09/3

Topics relating to physical electronics and computer and information systems are discussed. Specific attention is given to the following: heterojunctions; semiconductor materials and devices; quantum electronics; thin films; microwave acoustics; electromagnetic communication, radiation, and scattering; and rarefied gas dynamics and computational gas dynamics. In addition, computer systems, communication theory, automation, information retrieval, communication, analog and digital circuits, decision and control, digital signal and image processing, and climate and crop studies are considered. R.S.F.

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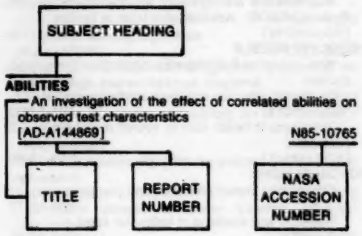
Typical Subject Index Listing



The subject heading is the key to the subject content of the document. Titles, report numbers, and accession numbers of pertinent documents are provided under each subject heading. When the title is insufficiently descriptive of the document content, a title extension has been added, separated from the title by three hyphens. The report number helps to indicate the type of document cited (e.g., NASA report, NASA translation, NASA contractor report). The NASA accession number is the number by which the document abstracts are arranged in this journal and by which the document is sold or requested. The titles, with title extensions if present, are arranged under each subject heading in ascending accession number order. The subject headings have been selected from the latest revision of the *NASA Thesaurus* (NASA SP-7051).

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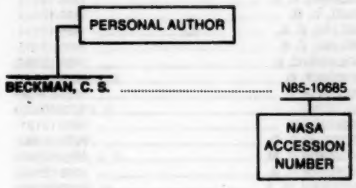

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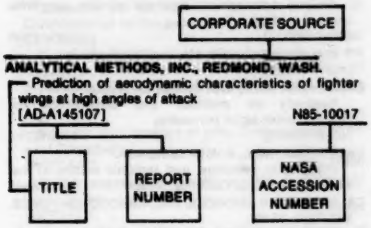

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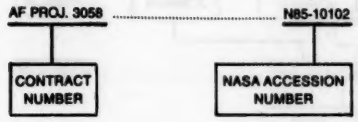

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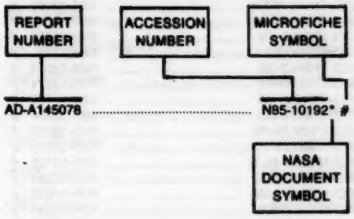

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